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CONDUCTED BY

MR. W. NEWTON,

OF THE OFFICE FOR PATENTS, CHANCERY LANE.

(Assisted by several Scientific Gentlemen.)

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I. Britten's Printing Machinery; Anderson's Impts. in Spinning Machinery; and Stow's Appts. for Propelling Vessels.

II. Murland and Lawson's Spinning Machinery; Pratt's Impts. in Making Earthenware Articles; Bleasdale and Ryder's Machinery for Making Rollers; Jennings' Impts. in Cocks and Water-Closets; and Froude's Atmospheric Railway Valve.

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No. CC.

RECENT PATENTS.

To John Britten, *of Liverpool, in the county of Lancaster, chemist, for certain improvements in machinery or apparatus for printing, ruling, and damping paper for various purposes.*—[Sealed 12th January, 1847.]

These improvements in machinery or apparatus for printing, ruling, and damping paper for various purposes, consist, firstly, in improvements in machinery or apparatus used in letter-press printing; secondly, in machinery for printing paper-hangings; thirdly, in an apparatus for printing progressive numbers, in the process called "reading in patterns," used principally in the carpet manufacture; fourthly, in an improved method of fixing the pens used in machines for ruling parallel lines upon paper; fifthly, in an apparatus applicable to damping postage stamps, labels, and other similar purposes; and sixthly, in a modification of the above, for damping the leaves of copying books or other sheets of paper.

In Plate I., fig. 1, represents a side elevation of the working parts of a printing-machine for printing one side of the sheet at a time. *a, a,* is part of the framing of the machine, and *b,* is the main driving-shaft, upon which is keyed a fly-wheel, of the requisite weight, provided with a winch-handle, for working the machine by manual labour; or steam or other power may be applied to work the said shaft. Upon the driving-shaft *b,* is fixed the principal distributing roller *c,* and two levers or cranks *d, d,* (one at each side of the machine,) which impel the "frisket" and inking roller-carriage *e, e,* by means of the rods *f, f.* The type-table *g,* is stationary, and the platten *h,* slides up and down in the slot *a**, *a**, of the framing. The rise and fall of the platten is effected in the following manner:—Upon one end of the cross-shaft *i,* two cranks *l,* and *m,* are fixed; and at the other, one crank corresponding to the crank *m*;—these cranks *m, m,* are connected to the platten *h,* by rods *n, n.* The crank *l,* is connected to the lever *d,* on the main driving-shaft, by the link *o,* and rod *p.* The pin which connects the link *o,* and rod *p,* being guided along the curved dotted line by the radius rod *q,* it will be obvious that, if the connecting-rod *p,* and link *o,* were of one piece, the lever *d, d,* would scarcely move any further in the direction of the arrow than the position shewn in the drawing; but their being jointed, allows the lever *d, d,* to continue its revolution. The same effect may be obtained in various ways; for instance, by causing the connecting-rod *p,* to shorten like a telescope; or the pin which joins the connecting-rod *p,* and crank *l,* may be made to slide in a slot cut in the crank *l,*—it being guided by a radius-rod, similar to the rod *q.* In fig. 2, the crank *d,* upon the driving-shaft is made to act upon a toothed segment *r,* gearing into a spur-pinion *s,* upon the end of the impression-shaft *i.* *t,* is the "bank" for holding blank sheets, and *u,* for printed sheets; *v,* is a claw for holding the blank sheet when placed ready; *w,* is a rod or shaft, extending across the frisket *x,* and having grippers attached to it in the usual manner. Besides the downward motion, which is common to all friskets that are separate from the type-table, the frisket in this machine is so arranged as to have a backward and forward motion on the carriage. The frisket is kept forward by a spring; but when the frisket *x,* comes under the platten, the end of the rod *w,* comes against a projecting piece *y,* fixed to the framing; by which means, the frisket is held stationary during the impression, without the necessity of bringing the carriage to a dead pause. The machine is worked as follows:—A sheet is projected a proper distance underneath the claw *v*;

and the attendant, having done this, is at liberty to leave it, and lay hold of the sheet last printed, which will be receding from under the platten. He retains the edge of this sheet in his hands until the finger *y**, coming in contact with the pendant catch *z*, causes the grippers, which are attached to the frisket, to relax their hold of the sheet, which the attendant lays on the bank *x*;—the further passage of the carriage carries the finger beyond the influence of the catch *z*, and thereby releases the grippers on the frisket, which spring upon the edge of the sheet projected from under the claw *v*, and draw it under the press. The catch *z*, has free motion in the direction of the arrow, but cannot move any further the reverse way than the position it now occupies.

Fig. 2, is a diagram, shewing another arrangement of single platten machine. *a*, is the frisket, and *b*, the type-table, connected together by endless straps or chains *c*, *c*, passing over pulleys *d*, *d*. The object of this arrangement is, that as the frisket and type-table both slide in separate guides in different directions, the platten need not be raised much higher than in the common hand-press.

Fig. 3, is a side elevation of part of a machine for printing both sides of the sheet at one operation. *a*, *a*, is the frame-work, and *b*, *b*, are the two plattens, fixed to the frame-work. *c*, *c*, are the two type-tables, fixed together by the rods *d*, *d*, which slide through the lower platten *b*. The type-tables *c*, *c*, may be made to rise and fall in any convenient manner; and the method of laying on the sheets is as follows:—The blankets or tympans are to be attached to the plattens, and the friskets to be suspended about half an inch from the blankets, in such a manner as to admit of their being pressed into contact with the blankets. *e*, and *f*, are two cylinders, having two chains (represented by the dotted line *g*,) passing over them,—one passing over each end and coupling the cylinders *e*, and *f*, together. Each of the chains *g*, should be, in length, exactly four times the circumference of one of the cylinders; and they are connected together by four light bars of steel or other metal h, h^1, h^2, h^3, placed equidistant, extending across the machine in the direction of the cylinders. Enlarged views of one of these bars *h*, with grippers attached, are shewn at figs. 4, 5, and 6. Fig. 4, shews an end view, with the gripper *i*, in the position it would be in when at h^3, with the gripper closed, and holding the edge of the sheet; fig. 5, shews the position at *h*, when just about to spring upon the fresh sheet; and fig. 6, is a plan view of one end of the bar *h*, with the gripper in the same position. The spur-wheel *k*, receives rotary motion by any convenient means: this wheel is one-fifth larger than the wheel *l*, but has teeth upon four-fifths of its periphery only. When the cylinders *e*, and *f*, have made one revolution and brought the blank sheets over the type-tables *c*, *c*, the stud *m*, is caught in the catch *n*, whereby the cylinders are held stationary. At the same time, the blank part of the wheel *k*, comes opposite the wheel *l*, and the type-tables *c*, *c*, are caused to rise in any convenient manner and give the impressions. Three sheets are in the press at one time,—one receiving its first impression, one resting around the cylinder *f*, and one receiving its second impression. The sheet is laid on at *h*, where it is seized by the grippers, and carried, at three intervals, through the machine, in the direction of the arrows, and delivered, printed upon both sides, below the cylinder *e*. The grippers are caused to relax their hold of the sheet, by the part *o*, of the gripper-rod coming against the curved guide p, p^1. Fig. 7, is a front view of the guide p, p^1; by which it will be seen that, when the part *o*, of the gripper-rod has passed the part p^1, of the curved guide, the crank *q*, will come into contact with the curved guide p, p^1, which will have the effect of throwing the gripper into a more completely inverted position, as shewn at fig. 5.

Fig. 8, is a section of part of a machine for printing paper-hangings. *a*, *a*, is the framing, to which the table *b*, *b*, is fixed; *c*, *c*, is the printing-block, which slides in slots in the framing, and is raised and lowered by the cam *d*, d^*; and *e*, *e*, is the pad, upon which the color is distributed, and which slides in longitudinal slots in the framing. Manual or other power being applied to the shaft *f*, it is to be communicated thence to the shaft *g*, by a strap or other convenient means. The rotation of the cam *h*, will, by means of the lever *i*, and link *k*, push the pad *e*, *e*, under the block *c*, *c*, as shewn in the drawing. The part *d**, of the cam *d*, then lowers the block *c*, upon the pad, to receive its color; the block *c*, then rises, and the pad *e, e*, is withdrawn by means of the balance-weight *l*,—when the block *c*, again descends, and gives the impression.

Fig. 9, is a side view, and fig. 10, a section of part of an arrangement of mechanism for printing progressive numbers, in the process called "reading in" patterns, which is a modification of the apparatus now in use for numbering railway tickets, the principal difference consisting in the method of working the type-wheels, which in this machine is effected by means of a rack *a*, in connection with a pointer *b*, and gearing in the spur-pinion *c*. The pointer *b*, is moved to and fro over the pattern by the attendant. The squares in the pattern being numbered, the type-wheels must be so arranged that when the pointer is over a certain square they will print the corresponding number. The pinion *c*, must be of such size that the passage of the pointer *b*, over ten squares shall cause the said pinion to revolve once, when a stud or tooth *e*, on the inside of the unit-wheel *d*, gives a tenth of a revolution to the toothed-wheel *f*, which, being in gear with the tens-wheel *g*, causes it to revolve one tooth; thus bringing a fresh type forward for printing. The same system is adopted with the hundreds-wheel *h*.

Fig. 11, is a side view of an apparatus for holding the pens in ruling-machines, both parallel and perpendicular; and also enabling them to be varied in their relative distances at the option of the attendant. *a, a, a*, are a series of levers, similar to what are commonly called "lazy tongs;" to the lower rivets of which, the pen-holders or sockets *b, b, b*, are attached,—the upper rivets sliding in the slots *c, c, c*. Thus it will be seen, that the ruling-pens may be thrown closer together or distended, by compressing or drawing out the levers *a, a, a*. Of course it will be evident that this arrangement will only be applicable in those cases where all the lines are required to be equidistant.

Fig. 12, is a section of a small apparatus for the purpose of damping paper previous to affixing postage stamps or labels, or for damping the stamps or labels themselves. *a, a*, represents a glass vessel, with another vessel *b*, inverted therein; the vessel *b*, is entirely covered with cotton velvet, or some other capillary material, which presents a flat surface at the part *c*. To make this apparatus ready for use, the vessel *b*, is taken out and soaked in water, until the capillary material becomes thoroughly moist; the vessel *b*, is then filled with water, and the inverted glass vessel *a*, placed over it; and the apparatus is then turned up into the position shewn in the drawing. The part *c*, will thus present a damp surface, for the purposes aforesaid, as long as any water remains in the vessel.

Fig. 13, represents, in transverse section, a modification of the above, applicable to damping the leaves of copying books, and to other similar purposes. *a, a*, is a cylindrical vessel of brass or other metal; *b, b*, are two horizontal plates, inserted into the cylinder and forming a longitudinal neck; and *c, c*, is a tongue of cloth, felt, or other capillary material, which, passing double between the plates *b, b*, and returning up the sides, makes the joints between the edges of the cylinder *a*, and plates *b, b*, water-tight. The cylinder or reservoir *a*, being filled with water at any convenient aperture, the tongue of felt or cloth *c, c*, when once thoroughly damp will remain so as long as any water is contained in the vessel *a, a*. The method of using the apparatus is to invert it, and upon drawing the tongue of felt or cloth *c, c*, over the paper, a sufficient amount of dampness will be imparted thereto.

The patentee claims, Firstly, as regards printing paper,—the particular construction and arrangements of machinery employed for that purpose, as above described and shewn in the drawing. Secondly,—the method shewn and described of keeping the pens used in ruling-machines perpendicular and parallel to each other. And, Thirdly,—the adaptation (as above described) of capillary attraction to the purpose of damping paper.—[*Inrolled in the Petty Bag Office, July*, 1847.]

To William Anderson, *of Clitheroe, in the county of Lancaster, cotton spinner, for certain improvements in machinery or apparatus for preparing and spinning cotton and other fibrous substances.*—[Sealed 22nd October, 1846.]

This invention of improvements in machinery or apparatus for preparing and spinning cotton and other fibrous substances, consists, firstly, in a peculiar mode of weighting the drawing-rollers, which mode of weighting is applicable to all the ordinary machinery used for preparing and spinning, wherein such rollers are employed; and, secondly, the invention relates to improvements in that class of spinning machinery called "self-acting mules," and more especially to the kind of mules known as "Smith's self-actors," and described in the specification of a patent, granted to James Smith, of Deanstone, on the 20th February, 1834.

This part of the invention consists in a certain novel arrangement of machinery or apparatus, whereby the "backing off" or unwinding of the spiral coils which remain upon the points of the spindles, after each stretch or "going out" of the carriage, is effected; and also in a novel method of applying the brake to stop the revolution of the "twist pulley-shaft."

The method of applying these improvements to one of Smith's self-actors is shewn in Plate I., where fig. 1, represents a side elevation of part of the head-stock of a self-acting mule, with the improvements applied thereto; and fig. 2, is a plan or horizontal view of the same. A, A, is the main driving-pulley, keyed fast upon the main driving-shaft B, and communicating motion to the cross-shaft C, by means of the pair of mitre-wheels D, D. Upon this cross-shaft C, is a pulley E, driving the shaft F, by means of a strap; and also another pulley G, which imparts motion, during the operation of spinning, to the twist pulley-shaft H, by means of the strap I. The twist pulley-shaft, with its gearing, is best seen in the longitudinal section fig. 3, and cross sections, figs. 4, 5, 6, and 7;—fig. 4, being a section at the line A, B, in fig. 3; fig. 5, a section at the line C, D; fig. 6, at the line E, F; and fig. 7, at the line G, H. *a,* is the fast or driving-pulley, and *b, b,* are the twist-pulleys, which impart motion to the drums for driving the spindles; and in the interior of the fast pulley *a,* is placed a ratchet-wheel *c,* which is loose upon the shaft H, but connected to the pulley *a,* by the ratchets or clicks *d, d, d,* and revolves with the fast pulley during the operation of spinning. This ratchet-wheel is furnished with an internal rim of teeth *e, e,* in which a small pinion *f,* gears. The pinion *f,* is mounted upon a stud, passing through the plate *g,* which is also loose upon the shaft H. Upon the same pin that carries the pinion *f,* (but on the other side of the plate *g,*) is fixed a small ratchet-pinion *h;* and a click *i,* is fixed to the spur-wheel *k,* but held out of immediate contact with the ratchet-pinion *h,* by means of a spiral spring *l,* (see fig. 5.) The spur-wheel *k,* is loose upon the shaft H, and revolves in the interior of the ordinary friction-pulley *m,* around which the bands pass for imparting the friction requisite for winding on. This pulley *m,* revolves loosely upon the tube *n,* which is also placed loose upon the shaft H. The tube *n,* has attached to it the plate or disc *o,* which carries the pinion *p.* At the other end of the tube *n,* a ratchet-wheel *q,* is fixed, which is connected by clicks *r, r, r,* to the spur-pinion *s;* which spur-pinion is driven by a spur-wheel, attached to the side of the ordinary mangle-wheel. *t,* is the backing-off pulley, which is placed loose upon the shaft H, but connected to it, whilst backing off, by the friction-belt *u, u,* being tightened upon the pulley *v,* which is fast upon the boss of the twist-pulley *b.* Thus it will be evident that, while the carriage is going out and the spinning operation is proceeding, the twist pulley-shaft H, being caused to revolve by a strap passing around its fast pulley *a,* carries with it the twist-pulleys *b, b,* and the friction-pulley *v.* The driving-strap is then thrown upon the loose pulley, and the shaft H, reversed, by means hereafter described (the pulleys *b,* and *v,* alone revolving with it); but as soon as the winding-on of the yarn commences, the spur-wheel *k,* in the interior of the friction-pulley *m,* will commence revolving, and, throwing the click *i,* into gear with the ratchet-wheel *k,* will prevent the pinion *f,* from revolving; thus causing the plate *g*, and wheel *c*, to revolve, and, by means of the clicks *d*, *d*, *d*, upon the fast pulley, throwing the whole of the apparatus into gear with the twist-pulley-shaft H. The apparatus for applying the brake to the fast pulley *a*, upon the twist pulley-shaft, and for reversing the said shaft, is shewn in figs. 1, and 2. To one end of the weighted lever *w*, the brake *x*, is fixed, and at or near the other end of the same is a pin *y*, which rests upon a catch *z*. When the carriage has nearly completed its stretch, a projecting part of the carriage throws the catch *z*, back; which motion allows the lever *w*, to fall, and throw the brake into contact with the pulley *a*, (from which the driving-strap has been removed,) and thus stop the rotation of the shaft H; another part of the carriage then comes against and depresses the lever 1, whereby the weighted lever *w*, is raised into its original position, and the brake is withdrawn. The finger 2, is next struck by another part of the carriage; whereby the catch 3, is lifted off the pin 4, and the weighted lever 5, is allowed to fall, and, by means of the rod 6, throw the catch-box 7, and 8, into gear. The half 7, of the catch-box is fast upon the boss of the spur-wheel 9, which is driven by the pinion 10, upon the cross-shaft F. The other half 8, of the catch-box is fixed to the pulley 11, to which one end of the chain 12, is attached, and its other end is fastened to the lever 13. This lever is attached to the friction-belt *u*;—thus, as soon as the catch-box 7, and 8, is thrown into gear, it will tighten the friction-belt *u*, upon the pulley *r*, and pull the twist pulley-shaft back one revolution, thus unwinding the spiral coils of yarn from the points of the spindles. Another part of the carriage then comes against the lever 14, and lifts the weighted lever 5, into its original position,—thus throwing the catch-box 7, and 8, out of gear; when the going in of the carriage and winding on of the yarn proceeds. The patentee observes that this twist pulley-shaft H, may be reversed, by toothed gear or other suitable contrivance.

The improved method of weighting the drawing-rollers is shewn at fig. 8; *a*, *a*, *a*, are the top rollers; and *b*, *b*, *b*, are the bottom rollers. The first pair of drawing-rollers is weighted in the usual manner, and the second and third pairs are weighted by means of the roller *c*, bearing upon both of them. By this method of weighting, a greater facility of piecing is effected, and time and labour are economized.—[*Inrolled in the Petty Bag Office, April,* 1847.]

To William Froude, *of Dartington, in the county of Devon, civil engineer, for improvements in the valves used in closing the tubes of atmospheric railways.*—[Sealed 5th January, 1848.]

This invention consists in an improved mode of constructing the valves used for closing the longitudinal slot or opening in the traction-tubes of atmospheric railways.

A transverse section of part of a traction-tube, furnished with the improved valves, is shewn in Plate II. The upper surface of the tube, on each side of the slot or opening, is formed into a seat for the valves; which valve-seat is bounded on each side by a perpendicular flange *a*, parallel to the slot or opening; and at the foot of each flange a slight recess is formed in the valve-seat. *b, b*, are plates of rolled or cast-iron, each about eight inches long, and of such a width that, while one edge abuts against the foot of the flange and rests in the recess, the other edge nearly reaches to the centre of the slot or opening; and those portions of the plates which close the slot are bent downwards, so as to fall into it and complete the cylindrical form of the interior of the tube. *c, c*, are continuous sheets of vulcanized India-rubber, having an upper surface of canvas; they cover the plates *b, b*, and extend up the inner side of the flanges, and over the top edge of the same; and the inner edge of each sheet is formed into a pad, which rests in a recess in the plate *b*.—*d, d*, are plates of rolled or cast-iron, of the same length as the plates *b*, and secured to those plates with their ends coinciding, by means of rivets (indicated by dotted lines), which also pass through the sheets of India-rubber. *e, e*, are bars, fastened to the flanges *a*, by screw-bolts and nuts *f, f*; these bars press the sheets of India-rubber firmly against the flanges *a*; and the lower edge of each bar presses on the "heel" of the plate *b*, and thus prevents it from rising, but at the same time admits of it turning on its heel as upon a hinge. The two pads of vulcanized India-rubber are made of such thickness that, when in an uncompressed state, each will extend beyond the centre of the valve-seat, and therefore, when brought into contact, the flaps or valves will assume the position indicated by the dotted lines; then pressure being applied to the upper surface, the flaps or valves will be caused to descend on to the valve-seat, and the India-rubber pads become compressed; and as the edges of the pads, which are in contact, are below a line drawn through the centres of motion of the flaps or valves, the elasticity of the India-rubber will tend to keep the flaps or valves in a closed state.

The flaps or valves are raised (in order to permit the arm that connects the piston to the train to pass between them) by means of five wheels, gradually increasing in diameter, which are carried by a bar at the back of the piston; after the piston-arm has passed, the flaps are permitted to descend into the position indicated by the dotted lines, by means of another series of five wheels, gradually decreasing in diameter, and carried by the same bar as the first set of wheels; and then the flaps or valves are pressed down upon the valve-seat by a wheel, suspended beneath the piston-carriage, and travelling upon the upper surface of the flaps or valves.

The patentee claims, "the constructing and applying a valve or diaphragm of greater width than the boundaries of the seat on which it is to rest, and in such manner that the edge or edges of the valve or diaphragm, along the line or lines of opening, shall be so formed, that when strongly pressed, the line or lines of opening shall be closed, and rendered air-tight or nearly air-tight, by straightening or comparatively straightening that bend or angular form of cross section which the valve is to be made capable of assuming when free; the excess of width which the valve or diaphragm endeavours to resume being provided for, either by sufficient extensibility in the seat of the valve, or sufficient compressibility in the parts of the valve itself, or by both of these methods combined. And, further, it is essential that the point of principal flexure in straightening the valve shall be carried either beyond the straight line joining the centres of pressure at the sides or abutments of the diaphragm, or so near to it that the elasticity brought into action by the straightening shall tend to keep the same closed, or otherwise not be able to cause the valve to resume its angular or bent form."—[*Inrolled in the Inrolment Office, July,* 1848.]

To JOSIAH GEORGE JENNINGS, *of Great Charlotte-street, Blackfriars-road, in the county of Surrey, plumber and builder, for improvements in cocks or taps, for drawing off liquids and gases.*—[Sealed 5th January, 1848.]

THIS invention consists in lining the interior of the barrels of cocks and taps with flexible material, in such manner that the passage through the barrels, when open, may be direct, and such passage may be closed by compressing the flexible lining.

In Plate II., fig. 1, is a longitudinal section of a cock or tap constructed according to this invention, having the passage through the same open; and fig. 2, is a longitudinal section of a cock or tap with the passage closed. *a,* is the barrel of the cock, containing a tubular lining *b,* which is fastened at one end in the manner shewn: this lining is made, by preference, of vulcanized India-rubber; but gutta-percha or other fluid-tight flexible material, not liable to be injuriously acted on by the liquid that is to be drawn off, may be used for this purpose. *c,* is a hollow wedge-formed piece, which is used for compressing the flexible lining, and thus closing the passage through the cock; it is acted on by the inclined pieces *d, d,* affixed to the plate *e.* This plate is provided with a square stem, to receive the key or handle *f*; by turning which, the inclined pieces *d,* are caused to act against the inclined sides of the wedge-piece *c*; and as this piece *c,* is prevented from turning (by a stud *g,* at each side, working in a groove *h,* in the case of the cock), it descends, and, by compressing the flexible lining, closes the passage, as shewn at fig. 2. When the inclined pieces *d, d,* are moved in the reverse direction, the pressure of the liquid causes the wedge-piece *c*, to rise, and the passage is thus opened, as shewn at fig. 1.

Fig. 3, is a longitudinal section of another cock or tap, in which the flexible lining *b*, is compressed, for the purpose of closing the passage, by means of a sphere *i*. This sphere is acted on by a hollow cylindrical plug *j*, furnished with a handle *h*, and having a spiral slot *k*, formed in it to receive the point of the screw *l*, which is introduced through the case of the cock; so that on the handle being turned in one direction, the plug *j*, will descend, and cause the sphere *i*, to compress the flexible lining and close the passage, as shewn; but on the handle being turned in the reverse direction, the plug will rise into the position indicated by the dotted lines, and the sphere *i*, will be forced upwards by the pressure of the liquid, leaving the passage open.

Fig. 4, represents so much of a water-closet as is necessary to shew that the passage from the pan may be made on the same plan as the above cocks or taps, or, to use the patentee's own words, "may be made into a cock or tap, according to my invention." In this arrangement, the passage from the pan is provided with a flexible lining *b*, which is compressed, and the passage thereby closed, by means of a slide *m*, acted on by a weighted lever *n*; the slide is drawn back and the passage opened by pulling up the handle *o*; and, on the handle being released, the slide is moved into its former position by the action of the weighted lever *n*.

The patentee states, that he has not thought it necessary to shew any cocks or taps for drawing off gases, as the only difference between them and the cocks above described is in the form of the barrels.

The patentee says he is aware that flexible materials have before been used in cocks and taps for closing them; in which case, it was necessary to have a fixed partition across the passages of the barrels, and therefore the liquids or gases did not pass direct through the same, but were bent out of their course; now, by his invention, he is enabled to avoid the use of partitions across the barrels of cocks or taps, and to obtain a direct course through the barrels;—the stoppage of the fluid being effected by simply compressing the flexible lining. He claims "the mode of constructing cocks and taps for drawing off liquids and gases, whereby the passages through the barrels are retained direct, and the closing is by flexible linings, as herein described."—[*Inrolled in the Inrolment Office, July,* 1848.]

To GARDNER STOW, *of New York, in the United States of America, Gent., for improvements in apparatus for propelling ships and other vessels,—being a communication.*—[Sealed 11th January, 1848.]

THE principal object of this invention is to employ the power of marine engines more economically than has heretofore been done, in order to obtain, with the same amount of power, a considerably increased propelling speed. This improvement is effected partly by the employment of paddle-wheels, having a peculiar form of oblique paddle, but principally by the arrangement or position of the propelling-wheels with regard to the vessel. In order to render more distinct the nature and advantages of his invention, the patentee makes the following prefatory remarks:—It is well known to all persons acquainted with steam-vessels, that in the modes hitherto adopted for propelling vessels on the water, whether by paddle-wheels or screws, a power has been required vastly superior to that which would suffice to move by traction a body of equal tonnage and draught at the same speed. This loss or useless absorption of the motive power has been variously accounted for; but, by careful experiment, the inventor of the hereafter described apparatus has found that paddle-wheels which strike the water in a line parallel to their axis, or at right angles to the progress of the vessel, absorb, by the repeated concussions (upon the surface of the water) of the paddles or floats, as they are brought round to enter the water, a considerable amount of power, which would be available to the propelling of the vessel if the paddles were to enter the water without beating it into a foam. Again, when the paddles or floats enter and leave the water at right angles to the vessel's course, a considerable lift of water takes place, by the paddles passing from a vertical to a horizontal position, and thus a further useless expenditure of the power of the engine occurs. When paddle-wheels, mounted in the ordinary manner, have their paddles or floats set at an angle with the axis of the wheel, the "slip" has (by reason of the oblique pressure of the paddles on the water, assisted also by the progressive motion of the vessel, which draws them from their work) been found to be so great as to counterbalance the advantage gained by their more ready entrance to and exit from the water. It has likewise been found that the screw-propeller, or its various modifications, although in some respects superior to the generality of paddle-wheels, is in other respects disadvantageous, because, by being submerged, its shaft and bearings present a considerable frictional or resisting surface to the water, and thus impede the progress of the vessel.

In the improved propelling apparatus, which forms the subject of the present patent, the advantages of the oblique paddles are said to be retained, and a hold is taken on the water equal to that of an endless screw propeller, without the disadvantage of bringing the axle and bearings of the screw, or the arms of angular blades, in continuous contact with the water.

The figures in Plate I., shew the mode of carrying out the invention; fig. 1, is a plan view of a vessel, with a pair of the improved paddle wheels applied thereto. A, A, is a shaft, placed horizontally across the vessel, and turning in suitable bearings, provided for the purpose;—this shaft is brought into connection with the steam-engine, or other motive power machinery, by means of gearing, crank-rods, or other convenient mechanism. At either end of the shaft A, is a bevilled pinion, in gear with other bevilled pinions, mounted respectively on the shafts B, B, which carry the propelling-wheels C, C, and turn in suitable bearings, provided on each side of the vessel. These shafts are shewn in the drawing as placed parallel to the central line of the vessel; but, if thought desirable, they may be set at such an angle as will not interfere with the efficient working of the propelling-paddles or floats. The dip of the wheels should be about one-seventh of their diameter; but when the wheels are very large, say thirty feet in diameter, a dip of about one-tenth of their diameter would be sufficient to ensure a good hold on the water. The manner in which the wheels are formed will be best seen by reference to figs. 2, and 3; fig. 2, being a side view, and fig. 3, an edge view of the improved wheel. The paddles or floats *a, a,* of this wheel are set at an angle of about 45° to the shaft; in which position they stand up from the periphery *b,* of the wheel, and are sustained by arms *c, c,* which project radially from the bosses of the wheel;—*d, d,* are stay-rods, for giving strength and firmness to the wheel. As this wheel partakes of the properties of a screw, and is intended to act in the manner of a screw—when rotating in the water, the ends of the paddles are made with a bevilled edge, to allow of their entering the water with the least possible resistance.

One mode which the inventor adopts for constructing the paddles or floats is shewn at fig. 4, and consists in making them of single plates of iron, suitably shaped, and attaching these several plates to their respective arms *c*; and, in order to obtain a uniform surface on each side of the paddle, and prevent any useless resistance to the water when the wheel is revolving therein, he applies, at the back of each plate of iron, filling pieces, of wood or other light substance, of a sufficient thickness to come flush with the face of the arms *c*; and thus the paddles or floats are made of a uniform thickness throughout, except at the edges, as before stated. But the mode preferred for making the paddles is, by enclosing the end of the radial arms *c,* with sheet metal, as shewn at fig. 5; by which means, a strong and efficient paddle may be economically produced. The paddle-wheels are mounted, as above stated, one on each side of the bows of the vessel, or they may be placed at any other convenient part, and at such an elevation with regard to the draught line of the vessel, as will admit of the wheels dipping in the water to the depth of the paddles or floats. It may be remarked, that when the wheels are made to revolve deeper in the water than is sufficient to immerse the paddles or floats, the economic application of the motive power, by the use of this invention, will diminish, and that in a ratio proportionate to the increased dip of the wheels.

From the foregoing it will be understood that each paddle, as it is immersed, acts as a wedge upon the water in precisely the same manner as the thread of a screw-propeller; but the threads of the improved propelling-wheel, formed by the oblique paddle, being short, compared to the thread of an Archimedean or other similar screw-propeller, the improved propelling-wheel will not be liable to work in the water which it has itself disturbed. If then the improved propelling-wheel is caused to rotate with a sufficient velocity, the water, being non-elastic, will offer a resistance somewhat resembling that of a solid body; and of this advantage is taken, for the propulsion of the vessel, to an extent that will greatly economize the motive power.

The patentee claims, Firstly,—the modes of constructing the paddles or floats, as above described; and, Secondly,—the mode of mounting paddle-wheels, possessing the properties of a screw, at such a height, with regard to the draught of the vessel to which they are applied, that when in action in calm water, their paddles or floats only shall be in contact with the water,—and in such a position with respect to the length of the vessel, that their shafts shall either be in a line parallel with the vessel's course, or, when placed at an angle, they shall verge towards the line of the vessel's course.—[*Inrolled in the Petty Bag Office, July,* 1848.]

To FELIX EDWARDS PRATT, *of Fenton Potteries, in the county of Stafford, earthenware manufacturer, for improvements in manufacturing articles composed of earthenware or china.*—[Sealed 31st December, 1847.]

THIS invention of improvements in manufacturing articles composed of earthenware or china applies to that class of articles which are cylindrical, or nearly so, on their outer circumference, and are formed on the "throw-wheel" or "jigger." According to the ordinary mode of manufacturing these articles, a ball of clay or other suitable plastic material is placed upon the throw-wheel or jigger, and brought, by the workman's fingers, into an embryo shape of the jar, box, pot, or lid, required to be formed; a gauge, or rib, or profile, is then applied to the outer circumference and the top edge of the article, to shape the outside correctly; while, at the same time, the workman, either with his fingers or with a chamfered edge tool, shapes the interior of the article; after which, it is removed from the wheel. When it has been left some time to dry, the box or other article is carried to a lathe, where it is turned down to its proper dimensions by a cutting tool or chisel, and smoothed and finished fit for undergoing the firing process. Now, the object of this invention is, to effect the manufacture of jars, pots, boxes, lids, and other similar articles, whose outer circumference is cylindrical (or whose outer and inner diameter is capable of being determined by the means hereafter described), in such a manner, that the clay or plastic material, while in a soft state, shall be so perfectly manipulated, as to assume the desired shape and proportions, and require no turning on the lathe to bring the article to the proper state for undergoing the operation of firing. The patentee remarks, that he is aware this object has been proposed, and in some degree carried out, by the employment of moulds, to form either the outside or the inside of the box, or pot, or lid, and of a rib, profile, or scraper, to complete its formation; but, although articles of uniform proportions may be thus produced, the cost of new moulds, when a change in the form or size of the article is required, must prevent their general adoption for low-priced wares, such as those which he intends generally to manufacture under the present patent.

In manufacturing jars, boxes, pots, and other similar articles, upon the throw-wheel or jigger, so as to economize the labor of the workman and the cost of moulds, while, at the same time, the articles under manufacture shall be made of uniform size, a cap-piece or mould, as shewn in Plate II., at A, A, fig. 1, is employed (it being suitably formed on its upper surface to recess the bottom of the pot, box, jar, or other article). This mould A, is placed upon the throw-wheel or jigger, and caused to rotate as usual; while upon it is laid a bat or disc of plastic clay or other material, formed to the proper size, and above this a ball, of the same material, is placed. The workman then, as the clay is rotating, shapes it into the embryo pot, jar, box, or other article; and, when so shaped, he applies thereto a gauge, of an improved construction, in a vertical, or nearly vertical, position, over the centre of the rotating throw-wheel or jigger; whereby the clay or other plastic material is quickly brought to the required shape, and is then ready to be removed, together with the mould A, from the throw-wheel or jigger.

The improved construction of gauge, which, by its action, effects the improvements above set forth, is thus described:—At fig. 1, the improved gauge, intended to form a "paste-box," is shewn, as applied to the mould A; and at figs. 2, and 3, it is shewn detached; fig. 2, being a view taken at the opposite side to that shewn at fig. 1; and fig. 3, being an edge view of the gauge inverted. This gauge is formed, by preference, of earthenware or porcelain, or of glass, or metal, and those of its edges which come into contact with the clay, to form the box or other article, are chamfered off, as shewn in the figures, so that but a thin edge shall act upon the clay, and all unnecessary contact therewith is avoided. It will be seen that the gauge embraces both sides of the box; it may, therefore, be properly termed a double-gauge. The centre part *a*, forms the interior, and the edge *b, b*, of the recess *c*, completes the outside of the box. By doubling the gauge, and enabling it to embrace the opposite sides of the box, it is intended to prevent the possibility of the workman producing varying sizes of box with the same tool; a result which he could not prevent if the gauge or tool had not a second recess to regulate the diameter of the box, and a bearing upon the mould, at the opposite side of the box, whereby to ensure the proper position of the gauge, with regard to the mould, and prevent the edge *b*, from being tipped out of a line parallel with the centre of motion. *d*, is a recess, which embraces the side of the box opposite to that of the recess *c*: its object and action is to cut away the clay, or destroy the work performed by the recess *c*, when the gauge is improperly placed upon the rotating mould, at which time it would (if the work could be perfected) produce a box of a larger or smaller size than is required. This recess *d*, need not, however, be of the precise form of the section of the article to be made; but it may, with advantage, be of larger proportions than the recess *c*, provided that some portion of its edge shall touch the periphery of the box or other article, and thereby ensure an unvarying diameter.

In using the gauge, the lower part of the edge *b*, at *b**, is to be brought flush against a raised part of the rotating mould A; and, being steadily held there by the workman, the gauge will remove all the superfluous clay, and perfect the form of the box or other article, which must necessarily be of the exact form and proportions indicated by the recess *c*, of the gauge;—the diameter being determined, as above stated, by the combined action of the two recesses *c*, and *d*. The gauge is now drawn off the clay, and the box or other article is removed from the throw-wheel or jigger to be dried. The above described operation is then repeated on another bat and ball of clay. When sufficiently hard to handle (which they will be in about two hours), the boxes or other articles are severally placed on a rotating-wheel, where their edges are trimmed, and their surfaces are also smoothed by suitable tools;—the bottom edge of the box, if required to have a rim, as shewn in the drawing, being trimmed with a tool shewn at fig. 4: they are then ready to undergo the firing operation.

From the foregoing it will be understood that the double-gauge is applicable to the formation of circular articles, the sectional figure of which is formed by vertical lines (the gauge being capable of removal therefrom, without disturbing the clay or other plastic material which it has brought into the required form); but it will be obvious that the gauge is also applicable to the formation of articles, the sides of which, in their sectional figure, incline upwards, to opposite sides of a common vertical line, as shewn in the diagram, fig. 5; and therefore such forms of articles may, in like manner to those with vertical sides, be completed (with the exception of the finishing) on the throw-wheel or jigger, and made ready for the firing process; thus dispensing with the use of the lathe, and effecting a great economy in the manufacture as well as an improvement in the article produced.

When articles of a greater or less exterior or interior diameter are required to be made, it will, in most cases, be only necessary to change the size of the gauge; but when a considerable increase or diminution in size is wanted, the mould A, should also be changed.

The patentee, in conclusion, states that he does not mean or intend to claim the application generally of gauges, ribs, or profiles, for forming upon the throw-wheel or jigger the exterior and interior (either singly or simultaneously) of jars, boxes, pots, or other similar articles; but he claims the exclusive use of a double-gauge, whereby he is enabled expeditiously to determine and ensure the exact and uniform capacity and dimensions of any number of jars, or boxes, or pots, or other similar articles, manufactured upon the throw-wheel or jigger; and at the same time can sufficiently perfect such articles, while in a plastic state, as to render the operation of turning at the lathe unnecessary.—[*Inrolled in the Petty Bag Office, June,* 1848.]

To William Longmaid, *of London, Gent., for improvements in the manufacture of alkali and chlorine.*—[Sealed 2nd November, 1847.]

This invention consists, firstly, in heating sulphate of iron or other metallic sulphate (deprived of moisture) with chloride of sodium in a close furnace, into which dry atmospheric air is admitted; whereby a product is obtained, containing sulphate of soda and oxide of iron, and chlorine is evolved. Dry sulphate of iron is obtained by evaporating the mother liquor of the copperas manufacture or the crystals of green copperas in a reverberatory furnace, at a low temperature (taking care not to expel the sulphuric acid); the resulting product is sulphate of iron, nearly free from moisture. 78 parts, by weight, of the dry sulphate of iron are mixed with about 60 parts of chloride of sodium, in a pulverized state; and then the patentee proceeds in the manner described for producing chlorine in the specification of his patent of August 4, 1845*: by this means, sulphate ash, containing sulphate of soda and oxide of iron, is obtained, and chlorine is evolved, which may be used in the manufacture of chloride of lime and other compounds of chlorine. Or the patentee adds to a hot saturated solution of chloride of sodium, an equivalent of sulphate of iron or other metallic sulphate, and evaporates the mixture to dryness in a reverberatory furnace; then he removes the partially calcined mass to a close furnace, and proceeds as before.

The second part of the invention consists in treating sulphate of iron or other metallic sulphates, or iron pyrites or other sulphurous ores, with chloride of potassium, in a reverberatory furnace, in the manner described in the specification of a patent obtained by the present patentee, Oct. 20, 1842,† when treating iron pyrites or other sulphurous ores with chloride of sodium. The product, which contains sulphate of potash and oxide of iron, or other metallic oxide, is lixiviated, and the liquor so obtained is evaporated to dryness, or otherwise used.

The third part of the invention consists in treating sulphate ash (being the product of the first process, above described, or being the product of the decomposition of iron pyrites or other sulphurous ores and chloride of sodium, as described in the specifications of the two patents before mentioned), by mixing it with small coal or other carbonaceous matter, and heating the mixture in a suitable furnace. 200 parts, by weight, of the sulphate ash, containing about 130 parts of sulphate of soda, are mixed with about 70 parts of small coal, and the mass is placed on the back bed of an ordinary black ash furnace; when sufficiently heated, it is moved on to the bed nearest the fire; and then another charge is placed on the back bed. After the charge is well fluxed, which usually happens in from fifty to sixty minutes, it is drawn; and when the ball or ash, so produced, has become cool, it is removed to the vats, and the alkaline matter dissolved out. The liquor, thus obtained, is brought into contact with carbonic acid by any of the ordinary means in use for carbonating alkaline liquors; it is then evaporated to dryness, and crude carbonate of soda is produced.

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* See Vol. XXVIII. of our present Series, p. 172.

† See Vol. XXIV. of our present Series, p. 274.

The patentee remarks that, in preparing the sulphate ash for the manufacture of alkali without the use of lime and with one lixiviation, he selects pyrites as free from silica as possible, or he employs the sulphate ash produced in the first process.

The patentee claims, Firstly,—decomposing common salt with sulphate of iron, to obtain sulphate of soda, oxide of iron, and chlorine. Secondly,—decomposing chloride of potassium with metallic sulphates, or iron pyrites, or other sulphurous ores. Thirdly,—working the sulphate ash into alkali at one operation, without first lixiviating it to separate the sulphate of soda from oxide of iron and other matters.—[*Inrolled in the Inrolment Office, May,* 1848.]

To CHARLES MURLAND, *of Castlewellan, Ireland, flax-spinner, and* EDWARD LAWSON, *of Leeds, in the county of York, machine-maker, for certain improvements in machinery for preparing and spinning flax and other fibrous substances.*—[Sealed 18th September, 1845.]

THESE improvements in machinery for preparing and spinning flax and other fibrous substances apply, in the first place, particularly to machines employed in the preparation and spinning of flax, and consist in a novel and peculiar combination and arrangement of two ordinary and well known machines, by which they are so worked, in immediate connection with each other, as to perform the operations of "drawing" or "slivering" and spinning in one machine. The machinery thus employed is the well known "screw-gill," as worked in connection with the preparation machinery and the common spinning-frame. The "gill" is of that class of preparing machines employed for opening, straightening, and separating the fibres of flax, hemp, long wool, and other materials of a similar description, in the operation called slivering. The several parts and operations of this machine, and also of the common spinning-frame, are so well known, both to the practical operative and the mechanic connected with the business of preparing and dressing flax, &c., as to require no detailed explanation thereof: in the following description they will, therefore, be merely generally alluded to.

In Plate II., fig. 1, is a front elevation of the mechanism; and fig. 2, is a vertical section, taken at the dotted line A, B, in fig. 1. This improved combination of machinery is designed to dispense with the operation of roving and twisting, in the preparation process, and thus to improve the uniformity and strength of the yarn; and also to supersede the use of bobbins, and their transmission from one frame to another in such operations; and, consequently, to prevent any injury to the slivers, between the preparation and spinning processes. A, A, A, represents the carriage or stand of the screw-gill, and B, B, B, the framework of the spinning-machine. The mode of operation of this combined machinery is as follows:—The slivers of flax are brought from the drawing-frame in the cans *a*, *a*, and placed one above the other upon the creel or stand *b*, (which will economize space, instead of all being placed upon the floor as usual,) they are then passed over the conductor rod *c*, *c*, onwards to the back rollers *d*, *d*, and from thence through the gills *e*, *e*, over the front drawing-roller *f*, *f*, through the water-trough *g*, *g*. The sliver then enters the ordinary spinning-frame, through the front and back rollers *h*, *h*, (which are mounted, as usual, in their stands or carriage *i*, *i*,) and proceeds through the thread-plate *j*, to the spindle *k*, *k*, *k*,—the whole being driven from the cylinder shaft *l*, *l*, and the train of gearing *m*, *m*, *m*.

The second part of the invention applies to the operation of spinning only,—the improvements being, in this instance (and by way of illustration), shewn as applied to spinning, twisting, or doubling flax; but it is equally applicable, in principle, to spinning cotton and other fibrous substances, the only difference being in the size and weight of the flyer. It is an improvement in the flyer of the spindle, or that part which conducts and winds on the thread to the bobbin, and is shewn, in three different (front, side, and top) views, at figs. 3, 4, and 5. The flyer consists of the legs *n*, *n*, as usual, with a twizzle or eye *o*, *o*; and the upper part is furnished with a ring *p*, for the purpose of preserving the thread from contact with the bobbin-head. A tube or conducting-piece *q*, is connected with the top of the flyer, having a spiral or curved slit *r*, *r*, cut or formed for the passage of the thread. This peculiar arrangement of flyer, with its conducting tube and spiral slit or opening, is equally applicable to spinning, twisting, or doubling cotton and other fibrous substances, and admits of the thread being spun direct from the drawing-rollers, without any intermediate preventive from the twist getting up to the nip of the rollers.

The patentees claim, Firstly,—the novel and particular combination, arrangement, or construction of the machinery, above described, and exhibited in the drawings; namely, the screw-gill and the spinning-frame, when employed for the purposes of drawing or slivering and spinning flax and other similar materials at one operation, or in one machine, as herein set forth. Secondly,—the peculiar form and construction of the spindle-flyer employed in spinning, twisting, or doubling machinery, as shewn in the drawing; it being furnished with a central conducting tube, or conducting orifice, for the thread or yarn, immediately above the centre of the spindle; such tube having a spiral or oblique cut or slit formed in it, made in that particular direction, as shewn in the drawing, for the passage of the thread or yarn, and in which the thread may be put whilst running. Thirdly,—the combination of a twizzle or eye above the flyer, with the ring at the flyer shoulder, for keeping the thread from the bobbin-head.—[*Inrolled in the Petty Bag Office, March*, 1846.]

To Charles Chabot, *of Skinner-street, Snow-hill, in the city of London, zincographer and engraver, for improvements in railway carriages, and in the buffers and other apparatus connected with such carriages.*—[Sealed 2nd September, 1847.]

This invention consists, firstly, in certain arrangements of brakes or other apparatus for retarding and stopping the progress of railway carriages; secondly, in certain improved arrangements of buffers and locking-apparatus, for bringing the whole train into one compact mass, whereby the safety of the carriages will be more secured, when a quick or sudden stoppage of the train is effected, and also if an axle should break when the train is in motion; thirdly, in an improvement in mounting the axle-boxes of the carriages; fourthly, in certain coupling or connecting links for joining one carriage to another.

In Plate III., these several improvements are shewn. Fig. 1, is a plan view of the framing of a carriage, with the apparatus for retarding and stopping the progress of the carriage applied thereto; fig. 2, is a longitudinal vertical section, taken in the line 1, 2, of fig. 1; and fig. 3, a cross section, taken in the line 3, 4, of the same figure. A, A, is the main framing of the carriage; B, B, is a rod, passed through the cross-bars of the carriage, and extending from end to end thereof;—each end of this rod B, is made tubular, to receive a flat-sided bar C, which is capable of sliding freely lengthwise into its recess. The outer ends of the rod B, are closed by cap-pieces,—suitable openings being made for the insertion of the sliding-bars C. D, D, are tubes, which respectively surround the ends of the rod B, and slide in sockets attached to the cross-bars A*, A*, of the carriage-framing. The outer end of each of these tubes D, embraces a flange on the ends of the rod B, B, and is thereby prevented from being drawn out of its place. Its outer end is closed with a cap-piece; a hole being cut in it to receive a pin or key, when a bar C, of the next adjoining carriage, is to be attached thereto. On the periphery of each tube D, coiled feather edges, somewhat similar to the thread of a screw, are attached. These feather-edges work in the metal sockets which support the tubes; and when these tubes D, D, receive a progressive horizontal motion (as will be hereafter described), they will partially rotate, by reason of the coiled thread on their periphery. This horizontal motion, which, in the first instance, emanates from the guard or brakesman of a train, is made available, not only to the braking of a single carriage, but also to that of all the carriages of a train, in the manner which will be presently described.

The peculiar construction of brake employed by the patentee, in connection with the parts above mentioned, consists of two annular friction surfaces *a*, *a*, (shewn in section at fig. 3,) which are made to embrace or bind upon the sides of a disc or circular plate *b*, keyed on to the axle *c*, of a pair of carriage-wheels. Fig. 4, represents this improved brake detached, and in plan or edge view; and fig. 5, is a view of the inner side of one of the annular friction-pieces;—both views being on an enlarged scale. *d*, *d*, *d*, are springs, attached to their respective annular friction-pieces *a*; and through their slotted ends (see fig. 5,) bolts, projecting from the pieces *a*, are passed; the object being, that these bolts, which severally carry a nut on their threaded end, shall be made to draw the springs in an opposite direction to that they would naturally take, by screwing up the nuts in contact therewith, and thus producing an elastic pressure of the pieces *a*, on the sides of the disc or plate *b*. Immediately above this brake is a pair of guide-rods E, which slide in sockets in the cross-bars of the carriage-framing. These rods each carry one of a pair of pendant arms F, which are capable of rocking on their centres, and are allowed to take a vertical position when the brake is required to be put on. *e*, is a cam-piece, mounted on the rod B, and intended to keep the arms F, from falling into contact with studs *f*, *f*, projecting from the outer side of the annular friction-pieces *a*. *g*, *g*, are pins which project from a collar, mounted loosely on the rod B, but prevented from sliding thereon. These pins enter holes in the pendant arms F, for the purpose of receiving a horizontal motion therefrom, and communicating it to the rod B. It should now be understood, that when the brake is not required to be applied to the carriage, the annular pieces *a*, *a*, and disc *b*, will revolve together without any friction taking place between them; but as soon as the brake is put on, the rotation of the pieces *a*, *a*, is stopped, and friction between them and the disc or plate *b*, (in exact proportion to the speed at which the carriage is travelling) immediately takes place. This operation is effected, as before stated, by the guard or brakesman, who, being seated in the carriage called "the guard's carriage," has command of a vertical shaft G, mounted in suitable bearings, and carrying, at its lower end, a bevilled pinion *h*, which gears into a bevilled pinion *i*, keyed on a hollow shaft H, turning in bearings in the cross-bars of the framing of the carriage. Through this shaft a rod B*, (similar in its object to B, of the brake-carriage) passes, and to the rod B*, the bar C, of the adjoining carriage is attached, as shewn in the enlarged sectional view at fig. 6. In the hollow shaft H, a longitudinal groove is cut to receive the feather-edge with which the rod B*, is provided, to make the rod and shaft turn simultaneously. On turning the vertical shaft G, a portion of a revolution, a similar movement is communicated to the shaft H, to the rod B*, thence to the bar C, and through it to the rod B. The partial revolution of the rod B, brings the smaller diameter of its cam *e*, into contact with the arms F, F, and allows those arms to fall into the position shewn by dots at fig. 3. By this means, on the next revolution of the disc *b*, the studs *f*, *f*, will come into contact with the edge of the arms F, F, and the revolution of the annular friction-pieces *a*, *a*, will cease. A slight forward movement is, however, allowed by the arms F, being mounted on the sliding-rods E, whereby the dead blow, which would otherwise be caused on the studs suddenly coming in contact with a rigid substance, will be prevented. This forward movement, by means of the pins *g*, carries the rod B, forward in the direction of the arrow, and effects the compression of the spring I, which is coiled round the rod B, and acts in an opposite direction, for the purpose of returning that rod to its original position. It will thus be understood, that the disc *b*, is rotating under great friction, which friction must continue until the cam *e*, is caused to partially rotate and throw the arms F, F, out of contact with the studs *f*, *f*, of the friction-pieces *a*, *a*. While the brake on the carriage adjoining the guard's carriage is being brought into action, a similar effect will be produced on all the carriages of the train, which are provided with like apparatus; for a bar C, being drawn out of its recess in a rod B, of another carriage, and attached by a pin to the tube D*, at the left-hand end of the carriage just described, the same motion will be communicated to the brake-apparatus of that carriage as was given to the first-mentioned carriage by the brakesman.

From the above description, it will be evident that the brakes will work with precisely the same effect, whether the train is proceeding to the right or the left-hand; and also that carriages may receive their brake-motion from either end of the guard's carriage. It should also be remarked, that both ends of the rod B, of every carriage but the guard's carriage should be recessed and provided with a bar C, to be attached, if required, to the tube D, of the next adjoining carriage, or pushed home into its recess when not wanted to be used. The object of this is to "turn ends" with each carriage, as is now commonly done.

A modification of the improved rotating brake is shewn in front elevation at fig. 9. It consists of a flanged wheel, round which a metal strap is bound; an adjusting screw and spring being applied to the ends of the strap to produce an elastic binding of the friction surface. *a, a*, is the flanged wheel, keyed to the axle of a pair of carriage-wheels; and round the wheel *a*, a strap *b*, is placed. This strap is tightened to any required degree on the periphery of the wheel *a*, by means of a screw and nut; and it is provided with a stud or pin *c*, which projects on either side, and comes in contact with the pendant arms *d, d*, (similar to those marked F, F, in the before described arrangement,) when they are allowed to fall into a vertical position; by which means the strap or friction-piece is prevented from rotating with the wheel, and thus the requisite friction for the retardation of the carriage is effected.

At figs. 7, and 8, another arrangement for setting the rotatory strap-brake in action is shewn, which arrangement may be also applied to the rotating disc or circular plate-brake, if thought desirable. Fig. 7, is a plan view of the framing of a carriage, with the apparatus attached; and fig. 8, is a sectional elevation, taken through the line 5, 6, of fig. 7. The carriages are coupled together by means of rods A, A, with which each carriage is provided, in addition to the ordinary draw-rods B. The ends of the rods marked A*, are provided with hooks, and they are capable of a sliding movement distinct from the part A, to which they are attached in the manner shewn in the drawing. In the guard's carriage, the rod B*, which is to be used as the ordinary draw-rod, is made capable of a slight vertical movement, for the purpose of releasing a catch (with which its end is provided) from a notch cut in a sliding-bar C, which forms the termination of the draw-rod, and carries the hook to receive the coupling-chain D. The inner end of this sliding-bar C, is provided with a guide-piece or fork, which embraces and slides on the rod B*, and prevents the bar C, from being displaced. E, is a strap-piece, embracing the end of the rod B*, and connected to a vertical rod F, which is suitably mounted for the guard to have the command thereof. The lower end of this rod is provided with a screw, which enters the strap E, and when the rod is turned round, the strap E, will be raised or depressed. By this means the notch of the rod B*, is withdrawn from the catch of the bar C, when required, and the connection between the guard's carriage and the adjoining carriage is at once slackened.

The object of thus slackening the connection between the carriages is to allow the drag to fall on the rods A, A*, which will thus be slidden longitudinally either to the right or left-hand, as the case may be, and draw a wedge or inclined plane, which is mounted on the bar A, from between the pair of arms or stopping-pieces *d, d.* These arms are supported on stationary horizontal rods, and are allowed to fall into a vertical position, and intercept the rotation of the friction-strap *b*, as before explained, when the wedge is withdrawn from between them. The like effect will be produced on the remaining carriages, the whole of which will experience the draw of the guard's carriage, which may be supposed to be in the middle of the train. If the guard applies an ordinary brake to slacken the speed of his carriage, and at the same time slackens the connection between the draw-rods B, and B*, the braking of all the carriages will be more quickly produced. When the train is brought to a stand, the engine must be slightly backed, to allow the various springs to return the brake apparatus to its quiescent position. The bar C, of the guard's carriage will then be drawn in by means of a coiled spring, confined in a barrel C*, (fig. 7,)—the bar being connected to the barrel by a chain or strap. This kind of return-spring is preferred when a small space only is available for the location of the spring. Its peculiar construction will be seen at figs. 10, and will be more particularly explained hereafter.

Figs. 7, and 8, also shew the mode of throwing an ordinary brake into action on the periphery of one of the running wheels, by the employment of the additional draw-rods just described. To the rod A, at about the middle of its length, a lever G, is jointed; its lower end passes through an axle H, supported in bearings at the lower part of the carriage-framing. Upon this axle H, is mounted an excentric I, furnished with an excentric strap and lever, which connect it with a brake-piece K. When the rod A, is drawn either to the right or left-hand, it will pull over the lever G, which will cause the axle H, to rock, and bring the increasing diameter of the excentric into a position for forcing the brake-piece K, against the periphery of the running wheel. It will be readily understood, on inspecting the drawing, that the action of the excentric will be the same, whether the rod A, is moved to the right-hand or to the left; and, if required, a pair of excentrics may be mounted on the axle H, to actuate a brake-piece for each wheel.

The second part of the invention, which refers, as before stated, to improved arrangements of buffers and locking apparatus, is shewn, under various modifications, in several of the figures.

One arrangement (shewn at figs. 1, and 2,) is thus described:—The buffer-rods K, K, are placed in the usual position in the framing of the carriages, and are kept up to their quiescent position by the ordinary springs provided for that purpose. Attached to the ends of the rods K, are, respectively, a cup or trumpet mouth-piece, and a piece, of suitable shape, to be inserted or to lock in such cup-piece. The shape preferred for the ends of the buffer-rods is shewn in the detached sectional view at fig. 11, which represents the outer ends of two buffer-rods, as driven home, in their locked position. When the buffer-rods are thus furnished with the hollow and pointed ends, if from any sudden cause the train is brought to a dead stand, the buffers (being respectively locked together) will be driven home and form one continuous line of framing; and the carriages will then not be able to ride over each other (as is at present the case when the flat buffers have lost contact) and convey the shock to the more fragile parts of the carriage; but the direct thrust will be received by the lines of buffer-rods, and the whole train will be kept on the line of rails,—thereby greatly mitigating the evils which might arise from a collision. In case also of a carriage-axle breaking, the carriage will still be kept on the line of rails, as the buffers will tend to maintain it in its erect position. At K*, fig. 1, a double joint is made in the buffer-rod, for allowing play only to that part of it which passes through the cross bar A*.

On referring to fig. 1, it will be seen that a carriage is provided with four buffer-rods, as usual, and that the ends of the buffer-rods which protrude from the same end of the carriage-framing are differently provided, one having a cup and the other a pointed piece: this is for the purpose of allowing the buffers of all the carriages to fit, when the carriages are "turned ends,"—a hollow and pointed buffer, by this arrangement, always coming together. The lip of the cup or trumpet mouth-piece *k*, (see fig. 11,) wholly receives the thrust of its pointed buffer, and forms a seat for the convex block of wood *l*; the point ensuring the entrance of the solid to the hollow buffer, even if the adjoining carriages (by being differently laden, or from any other cause) do not present the buffers on the same level; and also preserving the carriages, when locked, in one continuous level. *m*, is a hollow stopping-piece, attached to the framing, and intended to take the shock after the buffer-rods have been driven home; *n*, is one of the metal sockets, through which the buffer-rods slide; it is kept in its place by a block of vulcanized India-rubber, or other suitable elastic substance, which is confined in the hollow stopping-piece *m*. This elastic block is intended to allow a slight lateral play to the buffer-rods in case of need. Fig. 12, shews, in section, a modification of fig. 11,—the difference being, that the elastic block is let into the framing.

At figs. 7, and 8, a plan is shewn of locking those carriages together which are provided with the ordinary buffers. On the under side of the framing, just below the buffer-rods, a metal socket O, and a pin P, suitably formed to fit such socket, are securely fixed;—a pin and a socket being applied to each end of every carriage, for the purpose of turning ends, as before explained. When the speed of the train is slackened, and the buffers are driven into the position indicated by dots in fig. 8, the pieces O, and P, of the adjoining carriages will have locked together, and thus the whole train will be one firm and compact mass.

Another modification of the locking apparatus is shewn in sectional elevation at fig. 13. A, A, are portions of the end-framing of two carriages; and O, O*, are two metal sockets attached thereto. P, is a conical rod, capable of sliding in the socket O*, but secured from being drawn out of connection therewith by a collar at its inner end. The other end of the rod P, is attached by a pin to the socket O; which pin is removed when the carriages are required to be detached. It will thus be understood that a kind of telescope connection is made between the carriages; which connection is capable of adjusting itself in length, according as the distance between the buffers varies, and yet is capable of locking the carriages firmly together, in case of a collision;—the increasing diameter of the conical rod P, in that case, fitting tightly into the socket O*. When the locking apparatus is not required to be used, the rod P, may be disconnected from the socket O, and slidden under its own carriage.

A further modification of the improvements in locking the adjoining carriages of a train together is shewn at fig. 14. This arrangement is also intended to form the draw-coupling of the carriages. Q, Q, are the draw-rods of the respective carriages A, A, and to their outer ends the plates R, R, are secured. From the face of each of these plates a threaded bolt projects, for the purpose of being inserted into a female screw, formed in one end of the conical coupling-rods S, S: at their other ends these rods are secured respectively to one of the plates R; but they are allowed to slide freely in an opening made therein. When, therefore, this coupling is in operation as a draw-coupling, the parts are in the position shewn at fig. 14; but in case of a collision, the rods S, S, will slide through the plates R, to allow of the compression of the buffers, and at the same time prevent one carriage from rising above the other; they will also serve to partially support a carriage in the event of an axle breaking.

Figs. 7, and 8, shew also a mode of applying to the buffer-rods a coiled spring, enclosed in a box, similar to that employed for returning the bar c, of the last-described brake apparatus to its original position. The mode of constructing this spring will be readily understood by reference to the detached figures 10. 1, is the spring, coiled up in the box 2, which is mounted loosely on a shaft 3, extending across the framing of the carriage. One end of the spring 1, is attached to the box, and the other end is secured to the shaft 3, which is stationary. 4, is a lever attached to the box 2, for the purpose of connecting it by an arm 5, to the buffer-rod, as shewn at figs. 7, and 8. By this means the inward thrust of the buffer causes the box 2, to wind up the spring 1; which spring will return to its expanded position immediately that the pressure is removed from the buffers. A similar application of the enclosed spring is shewn in figs. 7, and 8, in connection with the draw-rods; but further explanation of its action will be useless.

The improvement in mounting the axle-boxes of railway carriages is shewn at figs. 15, and 16; fig. 15, being a longitudinal vertical section, and fig. 16, a plan view of the box. The novelty consists in applying between the axle-box and inner edges of its guide-plate a layer of vulcanized India-rubber or other elastic substance; the object of which is to allow of easement to the axles and wheels when the carriages are travelling over curves, and also when the carriages are locked together by the buffers. If the elastic packing for the buffer-rods, as above mentioned, is not employed, this mode of mounting the axle-box will be most desirable, to prevent the straining of any part of the buffing apparatus. In the figures 6, is the axle turning in brasses in its box 7; and 8, is the ordinary guide-plate. Within the vertical grooves, in the sides of the axle-box, a strip of elastic substance 9, is placed; 10, 10, are brasses for confining the elastic substance in its place. When the axles are required to take a line other than a right angle to the length of the carriage, the elastic substance will give to any extraordinary pressure, and, by elongating, be reduced sufficiently in thickness to allow of a slight backward or forward motion (as the case may be) of the axle-box in its guides; and thus the axle will be able to adjust itself to the required position, and prevent the strain of the buffing apparatus.

The last part of the invention refers, as before stated, to certain improved coupling or connecting links for attaching one carriage with the other. These connecting-pieces are shewn at figs. 17, and 18; figs. 17, represent one arrangement, which may be used in connection with the additional draw-rods A*, fig. 8. A*, A*, figs. 17, are the ends of the additional draw-rods; and they are each provided with links *a*, *a*, which are retained in their places by collars, as shewn, but are capable of turning independently of their rods. A female screw is cut in these links *a*, to receive the ends of the rods A*, which have a thread cut on them to fit the female screw. In connecting these rods together, it is only necessary to insert their ends in the links, and to screw them up, as shewn. The end of every rod A*, in the train, being similarly provided, it will be obvious that no difficulty will occur in the fitting of the parts, when connecting the carriages together.

At figs. 18, another arrangement of connecting link is shewn. In this the pieces to be connected are each provided with a screw, which enters a tapped hole in its fellow-piece, provided to receive it; and the pieces are attached to chains, the links of which receive the coupling-hooks of the draw-rods.

The patentee claims, First,—the general arrangement of apparatus, capable of giving motion to the brakes of a series of carriages, as explained with reference to figs. 1, 2, and 3; and particularly the construction and application of rotating brake, as therein shewn; parts of which brake may be stopped in their rotation, as before explained, to produce the amount of friction required to retard and stop the progress of railway carriages. Secondly,—the arrangement of apparatus, as described with reference to figs. 7, 8, and 9, for actuating a series of brakes by employing the draught, or a portion of the draught, of the train; and particularly the construction and application of a rotating drum or wheel and strap, when the strap is allowed to revolve with the drum or wheel, and is capable of being stopped to produce the required friction of surfaces for effecting the retardation and stoppage of railway-carriages, as shewn in the above-mentioned figures. Thirdly,—the peculiar construction of buffers which are capable of locking into each other, as shewn at figs. 11, and 12; also the elastic bearing for the buffer-rods; and likewise the stationary locking-pieces, for keeping the carriages in one continuous line; and, further, the application to railway-carriages of the coiled spring and box, for the purposes before mentioned. Fourthly,—the application to axle-boxes of vulcanized India-rubber, or other elastic substance, for the purposes above described. And, Lastly,—the construction of coupling-links, shewn and described.—[*Inrolled in the Petty Bag Office, March,* 1848.]

To SAMUEL CUNLIFFE LISTER, *of Manningham Hall, in the parish of Bradford, in the county of York, Esq., for improvements in stopping railway-trains and other carriages, and generally where a lifting power or pressure is required.**—[Sealed 18th January, 1848.]

THIS invention consists in applying brakes to the wheels of railway-carriages, by means of compressed air, or by the pressure of the atmosphere acting against a vacuum.

In carrying out this invention, the patentee places an air-vessel or receiver in the guard's carriage, and connects with it an air-pump, worked by gearing from one of the axles of the carriage, so as to keep the receiver filled with air at the required pressure, say 50 or 60 lbs. to the square inch. The receiver is connected by a branch-pipe, furnished with a valve, with a pipe beneath the carriage, extending the whole length of the same; each carriage is provided with a similar pipe, and the several pipes are connected by suitable joints, so as to form one continuous passage for the air from one end of the train to the other. The joints should be of such a kind as to permit the carriages to approach and recede from each other; and, for this purpose, the patentee prefers to have a hollow plunger ground into each end of the pipe, so as to work air-tight, and form a telescope-joint; or flexible pipes may be used to effect the same object. The main-pipe beneath each carriage communicates, by means of a branch-pipe, with a cylinder containing two pistons, as shewn in the drawing in Plate III., where *a*, is the main-pipe; *b*, marks the opening in the cylinder *c*, to receive the end of the branch-pipe; and *d*, *d*, are the pistons, the rods of which pass through guides *e*, *e*, and carry, at their outer ends, the brakes *f*, *f*.

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* By a disclaimer, dated 14th July, 1848, the words "and other carriages, and generally where a lifting power or pressure is required," are erased from the title of this patent, which now stands for "improvements in stopping railway-trains."

When it is desired to apply the brakes to the wheels, in order to stop the train, the guard opens the valve upon the pipe affixed to the receiver, and the air then rushes through the main-pipe and branch-pipes into the several cylinders, and, by acting on the pistons *d*, *d*, forces the brakes against the wheels. The patentee states, at this part of his specification, that the brakes act against the wheels or rails; but he has not shewn or described any mode of adapting the brakes to act upon the rails. It is not necessary that the pistons should move more than one inch; and when the compressed air is discharged from the main-pipe, the rotation of the wheels will cause the pistons to return to their former position. Although both pistons are shewn acting in one cylinder, in opposite directions, yet each piston may act in a separate cylinder, fixed close to each wheel.

Instead of using compressed air, the same effect may be obtained by producing a vacuum in the pipes, and permitting the atmospheric pressure to act on the pistons.

The patentee claims, as his invention, "so applying elastic fluids that they may be conducted to, and act on, the brakes of several carriages of a train simultaneously, or by a vacuum, as described."—[*Inrolled in the Inrolment Office, July*, 1848.]

To Henry Bleasdale, *of Chipping, in the county of Lancaster, roller maker, and* William Ryder, *of Bolton, in the same county, roller maker, for certain improvements in machinery or apparatus to be employed in the manufacture of rollers used in machinery for preparing and spinning cotton and other fibrous substances.*—[Sealed 14th December, 1846.]

This invention applies to machinery or apparatus used in the manufacture of rollers employed in all kinds of preparing and spinning machinery; which rollers are usually made in lengths of about fifteen to twenty-two inches each, and connected together by one end of each roller being made square, and fitting into a socket formed in the end of the next roller; each roller having one end formed square, and having a square socket at the other end. The invention consists principally in the construction or arrangement of a machine designed for punching the square holes or sockets in the ends of the rollers. But, in order to clearly point out the nature of their improvements, the patentees have given the following explanation of the ordinary methods of punching or forming the said sockets:—By one plan, the iron is cut off longer than the roller is required to be; and one end being heated, is "jumped up," so as to be thicker at that end; a circular hole is then drilled, and the iron being again heated, a square punch is inserted, and the iron beaten around it until a square socket is formed; after which, the superfluous iron, consequent upon the "jumping" of one end, has to be turned off. Another method is, one end of the roller being jumped to the required thickness, a portion of the metal jumped up is turned off, so as to form a square shoulder or collar; a circular hole is then drilled, and the square hole or socket punched in a machine in which the punch is moved forward by a screw,—the roller being held against the collar or shoulder to prevent it giving way. A certain number of rollers being thus punched, a punch of rather larger dimensions is substituted, and the rollers are passed through the machine again. This is repeated two or more times, and the shoulder or collar has then to be turned off. The present invention consists in a certain arrangement of mechanism for holding the rollers and punching the same, without either heating, jumping, or turning them, and without the necessity of changing the punches and passing the rollers through the machine more than once. By this plan a great economy is effected, not only in time and labor, but also in the iron, as the roller, not having to be jumped, does not require to be cut off so long, nor has any extraneous metal to be turned off.

In Plate II., fig. 1, is a plan or horizontal view of the machine, as seen from above; fig. 2, is a side elevation; and fig. 3, is a transverse section of the same. *a, a,* is the side and end framing of the apparatus; *b, b,* is the main driving-shaft; *c,* is the driving-pulley; and *d, d,* is the tool-carriage, moving longitudinally in slides *e, e,* attached to the side-framing *a, a.* This carriage *d, d,* has four V-grooves cut upon its surface, in which the punches 1, 2, 3, 4, are laid, and held firmly, nearly their whole length, by the grooved clamps *f, f,*—their ends having a firm abutment against the upright part *, of the carriage. It will be seen, in fig. 1, that the punches gradually diminish in length, so as to leave room for the cuttings—the punch marked 1, being the longest; and in fig. 3, that they increase in size—the punch marked 1, being the smallest. The carriage *d, d,* is caused to traverse longitudinally by the following means:—Upon the driving-shaft *b, b,* is a pinion *g,* taking into a spur-wheel *h,* upon the shaft *i*; at the other end of which is a pinion *k,* taking into a spur-wheel *l,* fixed upon the shaft *m.* This shaft *m,* carries an excentric *n,* which works between two brasses or bearings *o, o,* attached to the carriage *d, d,* thus imparting a traversing motion to the said carriage. *p, p,* is a table, which is capable of moving transversely between the slides *q, q, q.* The roller *r,* being previously drilled, and having the end faced square, is laid in a groove in the lower clamp *r**, on this table, with one end abutting against the stop *s,* which stop may be adjusted to the different lengths of rollers. The upper clamp *t,* is then placed over it, and screwed down firmly by turning the handles *u, u.* The table may be moved transversely, by turning the screw *v, v,* by means of the handle *w.* *x,* and x^1, are two plates or discs,—the plate *x,* being fast on the shaft *v,* and the plate x^1, loose, and having a notch cut upon its periphery, into which the catch *y*, falls when the roller *r*, is opposite to either of the punches 1, 2, 3, or 4. In first setting the machine, the handle *w*, is turned until the punch 1, is exactly opposite to the centre of the roller; the nut *z*, is then screwed tight to connect the plates *x*, and x^1, together. The strap being thrown on to the driving-pulley, the excentric *n*, is put in rotation, and then the tool-carriage *d*, *d*, is caused to advance and drive the punch 1, into the end of the roller *r*, As soon as the revolution of the excentric withdraws the punch 1, from the roller, the workman lifts the catch *y*, and turns the handle *w*, twice, which will bring the roller *r*, opposite to the punch 2, before the carriage returns,—when the punch 2, will cut the socket a little longer, and so on with the third, and in some instances with the fourth punch; the rollers may then be removed and another substituted, and the operation may be proceeded with as before. The excentric *n*, punch 1, and roller *r*, are best seen in the sectional view, fig. 4.

The patentees claim the employment and use of a machine for manufacturing rollers employed in the preparing and spinning of cotton and other fibrous substances, wherein two or more punches, gradually increasing in size and decreasing in length, are used; and in which the roller has a firm abutment at one end, and is held by clamps for the greater part of its entire length; and by which the square socket is punched without removing the roller from the machine or changing the punches.—[*Inrolled in the Petty Bag Office, June,* 1847.]

To Henry Winter, *now of No.* 10, *St. Petersburgh-place, Bayswater, in the county of Middlesex, but late of Uxbridge Gardens, Bark-place, Bayswater, in the county of Middlesex, Gent., for improvements in the manufacture of rope, cord, line, and twine,—being a communication.*—[Sealed 15th December, 1847.]

This invention consists in employing yarn made of cotton-waste (which is a refuse product obtained in the manufacture of the finer classes of cotton yarn) combined with yarn made of hemp, flax, or tow, for making rope, cord, line, and twine.

The two kinds of yarns may be combined in different proportions; but the best proportions are, two-thirds, by weight, of cotton-waste yarn to one-third of yarn made of hemp, flax, or tow, when manufacturing rope, cord, and line—and equal quantities, by weight, of each when making twine—as these proportions will produce rope, cord, line, and twine, of a strength equal to or greater than the strength of similar articles made entirely of hemp, flax, or tow, in the usual manner, and owing to such application of the cotton-waste the cost is greatly reduced.

In the manufacture of rope, the yarns of cotton-waste and hemp, flax, or tow, are combined in the above proportions; and, supposing a three-strand rope is to be made, the yarns are divided into twenty-seven parts, each of which is thrown separately; three of these are laid together to produce one "compound yarn"; then three compound yarns are laid into a strand; and three of these strands are laid into a rope: ropes of four or more strands may be made in like manner. It is not absolutely requisite that the mixed yarns should be laid into compound yarns, as three bundles of yarns, each consisting (when for a three-strand rope) of one-ninth of the whole of the yarns, may be thrown into a strand, and three of such strands laid into a rope. The patentee states that when he has combined the yarns, and slightly thrown them together, he steeps them in lime and water (prepared by first slaking the lime, by the use of two gallons of water to each bushel of lime, and then adding twenty gallons of water to each bushel of lime); after the yarns have soaked for three or four days, they are well washed, then soaked for three or four hours in a mixture of whiting and water (consisting of fifty-six pounds of whiting and twelve gallons of water) and hung up to dry; when dry, the yarns are thrown together more tightly; they are then ready for use; and they may be treated with tar, as usual in the manufacture of ropes of hemp, flax, or tow.

When making cord from hemp, flax, or tow, it is usual to employ three yarns to make each strand; but according to this invention, the mixed yarns are thrown into compound yarns, and three or more of such compound yarns are used in making a cord. The yarns are treated with lime and whiting, as above described; they are then dipped into warm size, partly dried, and twisted; and the cord made with the yarns is rubbed over with a solution of the sea-weed called Irish moss. This solution is prepared by boiling the Irish moss for two hours in water, in the proportion of one pound of the moss to three gallons of water; after which, the solution is strained; and when cold, it is fit for use.

In making line the compound yarns are used, which, after being treated with lime, whiting, and size, are to be well rubbed (to clean and smooth them) with a piece of coir rope, untwisted, and water; then three or more of such yarns are to be made into a line; and if very white line be required, whiting is to be mixed with the solution of Irish moss previous to applying it to the line.

Twine is made with two compound yarns, which are to be treated with lime, whiting, and size, as when making cord or line; and the twine made therewith is rubbed over with the solution of Irish moss.

The patentee claims the manufacture of rope, cord, line, and twine, by combining yarn made of cotton waste with yarn made of hemp, flax, or tow.—[*Inrolled in the Inrolment Office, June,* 1848.]

To James Murdoch, *of Staple Inn, in the county of Middlesex, for an improved capsule or small case, for protecting matters contained therein from the action of the air; and an improved material to be used in the manufacture of the said capsules,—being a communication.*—[Sealed 2nd November, 1847.]

This invention consists in an improved capsule, adapted to contain medicinal preparations, confections, and various other matters, solid, liquid, or in a pulverized state; and also in the use of a new material for making capsules.

The improved capsule consists of two parts, one shutting into the other; one part constitutes the case for receiving the matter to be preserved, and the other forms the lid or cover, which fits tightly over the case; and the capsule is hermetically sealed by slightly wetting the edges. The form of the capsule may be varied; but the form which will generally be found the most preferable is that of a cylinder with hemispherical ends. The capsules are made in the following manner:—Pairs of polished metal rods, of form and dimensions corresponding to the form and size of the case and cover respectively, are suspended from other rods, and dipped to the required depth in a solution of gelatine or other semiliquid or viscous material, and then withdrawn; whereby the lower end of each rod becomes coated with a film of gelatine, which, when dry, is removed from the rod. In order that the capsules may be readily detached, the surface of the rods should be slightly smeared with oil or grease; and a small passage should be made through each rod, from end to end, for the escape of air when the rod is immersed in the solution.

The improved capsule may be formed of gelatine, starch, or any other material which may be considered suitable, according to the intended use of the capsule; but when it is to serve as an envelope for medicine, the patentee prefers to make it of a vegetable substance, called Carragheen moss, or *fucus crispus*, which, when mixed with ten times its weight of boiling water, is reduced to a kind of vegetable gelatine, somewhat similar to animal gelatine. It is used in the same manner as the ordinary gelatine; but it has the advantage of being more soluble in the stomach; and it also more effectually protects the medicine from the action of the air. With the Carragheen moss, dissolved in water, may be mixed a portion of animal gelatine, syrups, perfumes, spices, coloring matters, and various other substances, according to the intended use of the capsule. The vegetable gelatine may be formed into leaves of any desired thickness, or cast in blocks of any form, so as to be stored, in a compact state, until required for use.

The patentee claims, Firstly,—the construction of capsules or small cases, for protecting matters enclosed therein from the action of the air, by making them in two separate pieces, the one fitting tight into the other, and forming together a kind of case and cover; such capsules being composed of gelatine, starch, or other suitable material capable of constituting a viscid solution. Secondly,—the manufacture of a vegetable gelatine from Carragheen moss, applicable to the construction of capsules of the ordinary description, and also as a gum or cement. Thirdly,—the application of the vegetable gelatine, above mentioned, to the manufacture of capsules of the improved construction before described.—[*Inrolled in the Inrolment Office, May,* 1848.]

To BENJAMIN MITCHELL, *of Huntingdonshire, farmer, for improvements in the manufacture of manure.*—[Sealed 13th January, 1848.]

THE object of this invention is to prepare manure, by combining vegetable with animal or other matter, so that the same may be deposited in the ground by the ordinary compost drill.

The mode of preparing the manure is as follows:—The floor of any suitable building, protected from rain and the weather, is littered with cut straw, not exceeding an inch in length, or with chaff obtained in dressing corn or seed (care being taken that no straw, or " eavings," or any other substance, exceeding one inch in length, is employed); upon this cattle are fed, and, as they require fresh litter, more cut straw or chaff is added, until a sufficient quantity has been accumulated; it is then removed to another building, on the floor of which the patentee first deposits a layer, six inches deep, of sifted ashes, and about one foot of the compost produced by the cattle; and if he can obtain any dead animals or fishes, he cuts the same into small pieces, which he mixes with the compost; and when the heap of compost is five or six feet high, he deposits on the top a layer of sifted ashes, from eight to twelve inches thick. Sometimes the patentee uses night-soil, in which case he makes a heap of compost as just described (but without adding the flesh of the dead animals or fishes); and on the top he deposits the night-soil, so that the fluid portion may descend into the heap; and upon the night-soil he places sifted ashes. At the expiration of a month, the ashes are removed from the top, and the heap turned over (care being taken to turn the outer parts of the heap into the centre); the ashes are then replaced on the top. The heap is allowed to rest for a month or five weeks longer; after which, the whole is mixed and broken into pieces with forks, and passed though a riddle, having orifices not exceeding one inch in diameter: it is then ready to be drilled or deposited in the land. The object of this invention is to get the manure quickly ready for being deposited by drills; for although, as is well known, manure, composed of comparatively long straw, when allowed to stand for a considerable length of time, will become suitably rotten and break readily to pieces, so as to pass through a similar sieve to that above mentioned; it will, besides requiring a long time for rotting, lose much of its valuable properties; whereas the straw, after being cut into small pieces, used as litter, and treated as above described, can be at once used in drills, without waiting for the straw to become so rotten as to break readily to pieces.

The patentee does not claim the making of manure or compost by littering animals with cut straw or chaff; but what he claims is, the making of manure as above described, by using straw cut very short, or chaff obtained in dressing corn or seeds, as litter; taking care that the matters are free from straw, eavings, or other substances, which would prevent the depositing of the same by the ordinary compost drill.—[*Inrolled in the Inrolment Office, July,* 1848.]

To WILLIAM HAYWOOD GLOVER, *of Stone Bridge, in the county of Chester, chemist, for improvements in the manufacture of oil from blubber.*—[Sealed 8th February, 1848.]

THIS invention consists in combining distilled products of resin with blubber oil, and thus improving the quality of such oils for lubricating axles and parts of machinery, and for other purposes.

The mode of carrying out this invention is as follows:—The patentee either separates the oil from blubber by the application of heat, sufficient to melt all the fatty matters, and to cause them to separate from the other matters contained in the blubber, or he operates upon the "dregs or foots," obtained in the treatment of fish or what are called blubber oils; and he extracts oil from the dregs or foots by applying heat to melt the fatty matters, and so as to cause it to separate from the other matters, which precipitate, and allow the fatty matters to be skimmed off; and, with such products of oil or fatty matters, he combines the balsamic or oily products obtained by distilling resin. These matters may be combined in various proportions; but the best proportions are stated to be, one part of oil to two parts of the distilled products of resin. They are combined by stirring them together in a pan, to which heat is to be applied, so as to keep the matters in a fluid state; when thoroughly blended, the mixture is allowed to cool; and it is then ready for use.

The patentee claims the combining distilled products of resin with oils, obtained direct from the blubber as it comes to this country, as described, or from foots or dregs, obtained from fish or what are called blubber oils, as described;—thus making a new preparation of oil, applicable to the uses above mentioned.—[*Inrolled in the Inrolment Office, July,* 1848.]

To WILLIAM HENRY BARLOW, *of Derby, civil engineer, for improvements in the manufacture of railway keys.*—[Sealed 27th January, 1848.]

IT is well known that the wooden keys used for securing the rails of railways in the chairs expand in wet weather, and contract and become loose in dry weather. Now this invention consists in impregnating the wooden keys with matters insoluble in water, so as to nearly, if not quite, prevent any expansion or contraction when in use.

There are many matters which, being insoluble in water, may be introduced into wood for the purpose of carrying out this invention; the patentee does not therefore claim the introduction of matters insoluble in water into wood, as that has been heretofore done for various purposes; but his invention consists in manufacturing railway keys of wood so treated. The materials which the patentee prefers and which he believes to be the best are, four gallons of creosote, one gallon of naphtha, twenty-four pounds pitch, and half a gallon of boiled linseed oil, mixed together; but other insoluble matters may be used, which will have the effect of preventing the keys from shrinking;—one gallon of the mixture is to be used to each cubic foot of wood. The wooden keys, after being cut to the desired form, are steamed for about four hours, which causes them to shrink considerably; they are then taken from the drying-stove and, whilst hot, subjected to the saturating process, which may be done by simple immersion for from sixteen to twenty-four hours; or the process may be greatly facilitated by placing the wooden keys in close vessels, exhausting the air therefrom, and then admitting the mixture.

In place of steaming and drying the wooden keys, a like effect may be obtained by steeping them in linseed oil, kept heated to from 200° to 220° Fahr.: on the keys being first introduced, there will be considerable ebullition; and, when that ceases, they are to be removed and subjected to the saturating process. The keys are now fit for use, supposing that they are not to be subjected to pressure; but the patentee prefers that they should be compressed, which he performs in the manner generally adopted for compressing wooden railway keys.

The patentee claims, as his invention, making wooden keys for railways by impregnating them with matter insoluble in water, so as to prevent or for the most part prevent them from expanding and contracting when in use.—[*Inrolled in the Inrolment Office, July,* 1848.]

To Thomas Walker, *of Hanley, in the parish of Stoke-upon-Trent, in the county of Stafford, potter, for a new and valuable mode of decorating articles of earthenware and china.*—[Sealed 20th November, 1847.]

This invention consists in the following mode of ornamenting china and earthenware:—The patentee takes a slice, bat, or slab of soft clay, suitable for moulding or fashioning into any article of earthenware or china, and of a size proportionate to the article required; on the surface of which he pours or sprinkles the slop clays or colors, and thereby produces the appearance of marble, agate, granite, and other ornamental surfaces of a similar nature. On the slice, bat, or slab, thus ornamented, or in any more advanced stage of manufacture (whether it be the moulded or stiff clay, or biscuit or glost state) he stamps or imprints slop clays or colors, by means of moveable self-adjusting blocks or stamps, constructed in various ways, according to the nature of the pattern and of the surface to be ornamented. The slop clays, or colors, when poured, sprinkled, or similarly applied to the slices, bats, or slabs of soft clay, will dry sufficiently for moulding at the ordinary temperature of the atmosphere; but the drying may be more speedily performed by submitting the slop clays or colors to a more moderate and well-regulated heat, applied solely to the surface thereof by steam, hot water, or other means.

Such articles as tiles, quarries, and flat ware, of several descriptions, have been ornamented in the stiff clay state by pouring or sprinkling slop clays or colors thereon, and thus producing ornamental surfaces similar to those mentioned in the first part of the above description;—the patentee does not, therefore, claim the application of this plan of coloring to articles in the stiff-clay state, except when the same are afterwards to be pressed up to a level face in a metal or other suitable mould. When slop clays or colors are to be stamped or imprinted on articles of earthenware or china in the moulded or stiff clay state, an oil or oleaginous liquid is preferred to be used instead of water for mixing the slop clays or colors. Oil may also be used with advantage, as regards the clearness and beauty of the patterns, in mixing the colors for stamping upon the biscuit or glost; but when economy is an object, water-colors may be used, as they do not require hardening on.

The patentee claims, as parts of his mode of ornamenting earthenware or china, First,—the application of slop clays or colors to slices, bats, or slabs of soft clay, suitable for moulding or fashioning into articles of earthenware or china, so as to produce various novel ornamental surfaces. Secondly, —the application of slop clay or colors to tiles, quarries, and other articles of earthenware or china in the stiff-clay state, when such articles are afterwards pressed in a mould. Thirdly,—all moveable self-adjusting blocks or stamps for stamping or imprinting slop clays or colors on articles of earthenware or china in any stage of the manufacture. Fourthly,—the use of oil or oleaginous liquid for mixing such slop clays or colors as are stamped or imprinted on articles of earthenware or china in any stage of the manufacture. Fifthly,—the drying of slop clays or colors when applied to bats, slices, or slabs of soft clay, by submitting them to a regular heat, applied solely to the surface.—[*Inrolled in the Inrolment Office, May*, 1848.]

Scientific Notices.

ON THE ORGANISATION OF LABOR.

> " Amass'd in man, there justly is beheld
> What through the whole creation has excelled:
> The life and growth of plants, of beasts the sense,
> The angel's forecast and intelligence:
> Say from these glorious seeds what harvest flows:
> Recount our blessings and compare our woes.
>
> * * * *
>
> Compelled our common impotence to mourn,
> Thus, thro' the round of age, to childhood we return."
>
> PRIOR.

The world has been often condemned, and perhaps too justly, by the satirists, for recognizing, as its sole great moving impulse, the sordid feeling of self interest. Without attempting to test the truth or fallacy of the reasoning on which this opinion of mankind is founded, we would take this power, which is said to be the prompter of man's actions, and apply it to the amelioration of the human species; for we doubt not it will be found to have sufficient scope of action to improve, in a great degree, the condition, and brighten the prospects of a large mass of the community. We have, of late, seen a fearful instance of the natural course by which disorganised labor lays prostrate national industry, and brings the rich and poor to one common level of destitution. Self interest may, therefore, be readily enlisted in the cause of social order; but how can that be preserved, while *industry*, our only staff and support, is left unemployed? Hitherto our thoughts, when on this theme, have run in isolated circles, corresponding in number with the various branches of industry; and thus our ideas (tethered, as it were, to an imaginary centre, which we considered the culminating point of prosperity) have, like the plodding mill-horse, continually completed the same dull changeless cycle. From this cause it has arisen, that legislation has so uniformly hemmed in and cramped the sphere of industry, allowing each several branch to tower to what height of perfection it could, but not to enlarge the base of its operations. Fortunately, from the prevalence of enterprise, the overflowings of surplus labor have been, from time to time, drawn off by some good genius, who, by his creative power, has raised up a new field for industry, destined in like manner to be prescribed by legislative wisdom. To prove the existence of this restrictive policy, we need not recall to mind those far back instances of interference with industry which shewed a fixed hostility to the introduction of machinery in lieu of hand labor, from the fear of releasing workmen from their accustomed employment; but we may refer to present times, when the importance of machinery was acknowledged as an element essential to the prosperity of a civilized community; and yet its exportation was put under a ban, lest the bodily toil of our fellow beings, in other countries than Great Britain, should be alleviated through our instrumentality. This was not all the evil, however, for the English laborer was also to feel directly the interdiction of the state policy. His skill and industry, which form the workman's only capital, was not allowed to be expended on a foreign soil; but how great soever the prospect of his advancement, he must forego the tempting offers of the foreigner, and for the interests of his country remain at home. And this policy, we think, would scarcely have been abandoned by this time, had not the impossibility of enforcing the edicts been proved by experience.* From whatever cause, it is certain that we are breaking through the series of enchanted circles which have so long prescribed the fields of industry; and let us hope, ere long, that great magician—KNOWLEDGE will dispel the remaining useless symbols of protection. Perseverance and ingenuity have triumphed over all obstacles, but we know not with what detriment to the results. The fear of foreign competition—the coveting to retain, either nationally or on the part of certain interests, the whole advantage of British ingenuity and skill—have been the prime cause of all the restrictive enactments which affected the manufacturing interests; and thus has industry (which would, if unmolested, have, in a great degree, become self organising) been disorganised; and the artizan, instead of rising to a position of independence, has been held down and made dependent on his native soil.

But we must not look to imperial legislation as the only cause of the oppression of the industrious classes,—there is another power which has used an imperial dictatorship, hardly less pernicious to the true interests of the various grades of artificers. The power to which we allude is, that of the Trades' Unions, which, in theory, pretend to protect the rights of their members, but are no sooner brought into action, than they prove their *grievous bane.* To such of the rules of these institutions as refer to the system of apprenticeship, we can raise no great objection; for it would seem natural, that all trades should have some species of organisation. If we refer to early history, we shall find, that in Egypt certain families or tribes were set apart to a particular employment, and honored or despised, according to the estimation in which the various occupations they followed were held. Thus the Israelites, when they entered Egypt, had a certain locality assigned to them for their residence, because theirs was a pastoral life, which was "an abomination to the Egyptians." At a later period, when Alexander, after his conquests in Persia, led the Greeks into India, they remarked the division of the people into hereditary castes, although slavery, in its full sense, was unknown amongst them; and, to the present day, the same distribution of employment has continued,—it having survived the devastations of foreign conquerors, and the frequently recurring civil feuds. A milder form of castes has existed in this country for ages, and, although circumstances have conspired to make great inroads into privileges of all kinds, yet we find, in the more ancient of our cities, that freemen ot the various incorporated companies still retain great and peculiar advantages, which enable them to obtain work in their locality, not only on better terms than strangers, but even to their total exclusion. It is not then surprising, that with this example before them, other trades, of more recent foundation, should have attempted to secure similar rights; and, therefore, the apprenticeship system was employed as a check to all interlopers. But, without combination, this restrictive policy could not be carried out; it was therefore found necessary to establish a kind of senate, whose duty it should be to intimidate masters and capitalists, and prevent the employment of all workmen, no matter what their abilities, who had not undergone the limited servitude of apprenticeship, which admitted them to the rights and privileges of the trade. A union of this kind could not be otherwise, in its effects, than directly opposed to the interests of the employer, as he was deprived of the right of choosing his assistants, except from a body of men animated by one common feeling and design; and, in proportion as he was found to be in the power of his men, so in the ordinary nature of things would their pretensions increase. From the establishment of Trades' Unions we may therefore date the divergence of interests between the employers and employed (city freedoms being too limited in extent to effect the question further than as respects the origin of industrial privileges), whose prosperity, if rightly considered, would ever be found linked together. In order, therefore, to retain this power, masters were for greatly increasing, while the workmen were for limiting, the number of their privileged class. The real evil of these combinations did not, however, become strikingly manifest, until, by enrolling the workmen of whole districts, where one kind of employment predominated, and accumulating a large fund, through the subscriptions of each member, the little senate of workmen, who directed the movements of the mass, conceived they had the power of fixing the rate of remuneration and the duration of labor;—then followed, either from the extravagance of their demands or the obstinacy of the masters, the cessation of industry, by the "strikes," which ended in the absorption of the workmen's hard-earned savings, their destitution, and demoralization. Now, before this stage in the disorganisation of labor had been arrived at, we think the legislature might fairly have interposed; for none could say but that a large proportion of the men who are involved in the consequences of a strike, would gladly return to their duty if they could safely do so; but intimidation is the cord which binds them into one mass. We think, then, there are good grounds why the legislature should interfere with Trades' Unions, as they at present exist, and crush the petty tyranny under which so large a portion of the laboring community is depressed; for it requires no great insight into the nature of man to discover (and that even among the most enlightened) a natural imperfection of mind, which incapacitates him from judging fairly on a subject where his interest is directly concerned. Hence arise the monstrous pretensions to national rights which so frequently deluge the civilized world with blood: the *justice* of the cause has been always pleaded. In the midst of a community of interests it may be safely asserted, that the existence of an isolated body, whether consisting of large numbers, or formidable only from its wealth, cannot be otherwise than pernicious to the country, when it has the power of dictating its own laws and enforcing its own decrees. This was well understood by our forefathers, who, in framing the English constitution, erected three estates, whose different bias should check each one the other in acts of folly or injustice. Why then should we suffer one class, and that notoriously the most ignorant, to guide or stop the springs of industry, which, if ill directed, or unadvisedly checked, must become the source of incalculable evils?

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* "And whereas by an Act passed in the Session of Parliament, held in the Third and Fourth Years of His late Majesty King *William* the Fourth, intituled *An Act for the general Regulation of the Customs*, and by the Table therein contained, denominated 'A Table of Prohibitions and Restrictions Outwards,' the tools, utensils, machinery, and articles described in the said Table, and in the Schedule hereto annexed, were, amongst other things, absolutely prohibited to be exported from the United Kingdom: And whereas it is expedient that the said prohibition of the exportation of the said tools, utensils, machinery, and articles should be repealed; be it enacted, That so much of the said Act and Table as prohibits the exportation from the United Kingdom of the tools, utensils, machinery, and articles described in the Schedule hereunto annexed, shall be and the same is hereby repealed."—[*Extract from Act to amend the laws relating to the Customs, 6 & 7 Vic., cap.* 84.]

If the delegates of Trades' Unions had really possessed the power, they would, as representing one isolated interest, have forced most unjust conditions upon their employers, inasmuch as they would have been in the position of framers and administrators of their own laws. We should *then* have seen the government stepping forward to suppress these institutions; but, as the will of the delegates was impotent to effect their designs, they were allowed unrestrained liberty, short of actual violence, to oppress their fellows, and compel the contented to sacrifice their present comforts for the dreary hopes of effecting an amelioration of their condition, by ceasing to produce the wealth by which alone they can live. It is needless to say, that this policy has again and again been attempted to be carried out, and that misery, the most appalling, has been the consequence, where the workmen have not quickly seen their error; for, as they for the most part live from hand to mouth, and the employer has nothing but the interest of his capital jeopardized, the conflict is unequal, and must always end in those who starve soonest being the vanquished. But an evil, much greater than that of immediate and temporary destitution, is caused by recourse to strikes, when any fancied or real oppression is required to be removed; and that evil is, the introduction to that branch of industry, which is thus paralysed, of a fresh supply of hands, drawn by the prospect of better pay than they have been in the habit of receiving, either from other branches of home labor or from foreign countries. To this means masters have had occasion to resort, and the effect has been, to permanently reduce wages, by causing an influx of workmen, greater than the trade could possibly require. Domestic trades present many instances of being overstocked with labor; and, in every case, it has been the result of impolitic combination. We would not have it understood, from these remarks, that our opinion would favor the notion that, in these strikes, injustice was invariably on the side of the workmen,—our wish is to shew the inutility and impolicy of such exhibitions of temper, which check the enterprise of capitalists, and result in nothing but injury to the supposed aggrieved party. Trades' Unions, we would advocate as aids to the organisation of labor; but they should be established on a different basis. Let them be really friendly societies, administering to the necessities of their members when in sickness, and, through their ramified branches, ascertaining the wants of manufactures in distant localities, and supplying hands where more help was required; but in no case interfering, directly or indirectly, with the will of the members; it being at their own option to accept or reject any wages or employment which may be offered them. To legislate on wages is simply a fallacy which has been proved a hundred times. No law can either permanently raise or lower wages; but it may in a degree prevent grinding oppression, which would lower, or combination, which would raise them;—thus, in a negative sense, our government might act; but supply and demand must be the great regulator. Since, then, the expansion of industrial pursuits is the cause of an increased demand for labor, it should be the grand object of Parliament to remove all obstructions to a free interchange of commodities with other nations; and both employer and artizan should strive to their utmost to facilitate production, whereby such interchange might be profitably carried on to the general benefit of the community, whose capabilities to enlarge their purchases for home consumption must ever depend on the general prosperity of the country.

Society for the Encouragement of National Industry, Paris.—M. Dumas' Address.

If we are to value knowledge in the same manner that a certain modern political economist would have us prize more material fruits of industry, viz., by the amount of labor expended in production, we should then perhaps be only shewing our high appreciation of that power, by throwing obstacles in the way of its attainment; but, as we have arrived at a period in the world's history, when man's intellectual development is found to produce more satisfactory results than the increase of his muscular powers, it is time the work was set about in earnest to lay open the treasures of experience to the wondering gaze of the ignorant laborer, with a view to interest him in his occupation; and thus to bring his reflecting faculties to bear upon the improvement of his department of industry. We have frequently adverted to this subject when recording the exertions of societies for the encouragement of arts and manufactures in foreign countries; and we have then pointed out the desirableness of founding such societies in this country. It is not that we are altogether destitute of the advantages which we see so well applied abroad; but the assistance which the mechanic here obtains from the experience of others is simply nothing; for he is quite ignorant of the means employed in other trades than his own to effect what perhaps he feels would be of great service in his branch of manufacture. And again, as regards the engineer, how little does he know of the failures of others in new applications or combinations, which, if made public, might guide him, by a short path, to the achievement of his ends; whereas, at present, if he has a new problem to solve (and how many, for instance, required solution before this country was interlaced with its endless lines of railways), he pursues his experiments in secret, for fear of failure, and at the cost of his employers, whose losses on this score are frequently very serious; while, if, as in the case of the atmospheric railways, they become public, the community reap the advantage of the knowledge which has been purchased by private companies. Our readers will have seen, by the valuable papers which have appeared, from time to time, in our pages, as translations from foreign journals, that in France the government has spared no expense to test the value of plans which were thought likely to be of public utility; and that the manner of carrying on such tests was admirably suited to the obtaining of a fair result. The channel through which these experiments have been carried on in France is, the Society for the Encouragement of National Industry, which, from its constitution, admits of all inventors and discoverers making their voices heard; and, being supplied with funds from the national exchequer, the council of the society is enabled, through the co-operation of the inventor, to ascertain the utility of any plan which has been submitted for consideration;—a further advantage is, that suitable rewards can be adjudged to successful candidates for fame. If the use of such a society in this country be cavilled at, and we be taunted with the question, Why, under such advantages, is France still so far behind us in her domestic progress? we would reply, that knowledge is not itself all sufficient to ensure progress; but it must fall upon a genial soil to obtain a vigorous growth. While, therefore, we cannot but admire the perseverance which has effected the advance of the industrial arts in this country, we may be permitted to retain the opinion that, if the same amount of energy had been guided by skill, England would have exhibited a more satisfactory picture of progress. We will therefore hope that, ere long, the president of a society for the encouragement of English ingenuity will be enabled, with as much truth, to recount the labors of its members, as M. Dumas has done in the following flowery speech, which sets forth the history of the society of which he is one of the guiding stars.

Gentlemen,—

The Society for the Encouragement of National Industry, founded by the élite of France towards the close of the old republic, has acquired a constitution which nothing has been able to shake until now. It has witnessed the rise and fall of three dynasties, swept away by the irresistible flood which, at intervals of fifteen years, broke through the barriers of authority; and, while all around was changing or being hurried to destruction, this Society has always endeavoured, with scrupulous care, to follow out the objects of its founders, and to preserve intact its original plans of action. Thus, after half a century, during which so many storms darkened the horizon, this Society is still in perfect harmony with the wants and wishes of the country, and requires no material alteration in the rules by which it is governed. By these rules every Frenchman has a right to become a member,—every member can make himself heard;—a council, chosen by general election, renewed every year, watches over the interests of the Society: it has never deviated from its established course, but devoted all its energies to the development of industry and agriculture,—recompensing successful efforts, assisting unfortunate talent, adopting all efforts of which it witnessed the birth, and taking under its protection all those inventions which it called forth. Supported by the country, it returns all that it receives from it, and renders its savings profitable, by the amount of intelligence brought to bear upon them. The Society of Encouragement has thus, for a long period, presented to France the model of a truly patriotic and liberal institution; and it will, it is to be hoped, retain this position, and employ, for the national benefit, the new powers which have been conferred upon it by political events. These powers are very great; for you are organised in such a manner, as to constitute an academy of industrial sciences,—being prepared for the study of questions which may be raised by intelligent minds; seeing that you are certain your voice will be listened to by the authorities. No one wishes now to forget the long continuation of good understanding and confidence which have for so many years united the Minister of Agriculture and Commerce and the Society of Encouragement. We have however a right to think that, in future, our ideas and opinions will be better understood and appreciated. What is there now demanded which has not been long declared to be a pressing want of France? Cheap living.—Have you not, for two years past, devoted long and serious study to the solution of this problem? Have you not concentrated all your energies, and brought all your disposable resources to bear, for the purpose of attaining this much desired end? When you proposed questions in agricultural science, having for their object the augmentation of the product, whether in provender, manure, meat, or milk, or of leguminous or cereal products;—when you so liberally voted a sum of 100,000 francs in favor of French agriculture, had you not determined that, for the security and happiness of France, it was time she inscribed on her banner *cheap living for all?*

Salubrious living.—Is it not here we have heard proclaimed, with an earnestness worthy of a better fate, the necessity of introducing in manufactories, in all works undertaken for promoting health in towns, and even in private habitations, all the processes which have been known to science, and approved in practice; and which assure to all the enjoyment of pure air and abundant light, and prevent the action of those noxious exhalations which, in time, prove injurious to the health and constitution of the people,—thereby causing them to degenerate and become enervated? Have you not, even now, crowned with success the efforts stimulated by your prolonged and courageous perseverance? And when our towns and dwellings, thus rendered healthy, shall supply our agricultural districts with better and more abundant manure, have we not a right to say, that this twofold benefit shall have been your work, and will call down public gratitude upon this Society?

But it is not sufficient for our people, ennobled by the long enjoyment of civil liberty, and animated with the proud feeling of equality engraven on all their hearts, to obtain from the institutions of their country this cheap and salubrious living which you labour to procure for them: other wants agitate them, which you have fortunately divined; and you have therefore claimed for all the right to a place at the banquet of moral and intellectual life.

The education of children in the manufacturing and the agricultural districts, as also of the industrious population of all degrees and ages, has for a long time appeared to you one of the objects most worthy of your attention. You have devoted much time to the examination of the questions raised on this subject; and this is not the time for you to give up your right of throwing into the scale of public power the weight of an authority founded upon long practice, of experience ripened by attention, and of a devotion to the interests of the laboring portion of the community—an authority which has not been the spontaneous growth of present circumstances.

We have only to repeat what we formerly said, viz., that "Agriculture, manufactures, and commerce, form the pursuits of the main body of the nation; it is from their ranks that the army is principally recruited; it is from their labors that the revenue required by the State is produced, and it is on their produce that our enjoyments, our well being, nay, even our very existence, depend. It will not do to leave to chance or caprice the education of the sons or successors of our agriculturists, our manufacturers, or our merchants. The state owes to its children—who will one day constitute its strength, its riches, and its security—the same protection which it accords to the pupils in our colleges, who are preparing for literary pursuits."*

In future, the state will discharge this sacred debt;—we shall see the blessings of education showered upon all; and, thanks to the measures which are in preparation, the success of intelligence constituting a right to the protection of the country;—the child who shall distinguish himself in our schools will be able to raise himself by his industry, intelligence, and morality, from the lowest grade to the highest station in society; and in the same manner that every soldier carries in his knapsack the marshal's bâton, let every child of the country find in his school-desk the first round of the ladder by which he may mount to the summit of society.

The support of physical life by abundant and salubrious food, and the development of moral and intellectual life by a widely-spread instruction, is what you have continually demanded in the name of the christian Fraternity, which is engraven on all your hearts, and was manifested by all your acts before it took its dazzling place in the national colors.

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* It is well to contrast the opinions of men, whose position gives those opinions force among the unthinking mass, which at present (as respects the science of legislation) is the great bulk of the people. The following extract from a leader in the "Times," dated July 19th, 1848, clearly indicates the system of philosophy studied by the writer:—"In Ireland there is poverty, *the curse and consequence of a too dense population,*—so there was and is in France." According to this rule, the late famine, with its severe mortality, must have been a blessing to the remaining population in the one country, and the slaughter in Paris a similar benefit to the other.

You had well understood this fraternity;—you who knew so well that national industry comprehends the whole nation;—you who are aware that, for a long time, it has had a tendency to grasp all of us in its irresistible movement, and that it makes of all of us workmen occupied with the common interest;—you who have so often declared that the day of the indolent was past, and the dawn of the busy had appeared;—you who prove so well, by your example, that every one works for the general good in creating riches, which are distributed to all; and that the arm and the head once united, confidence will be restored and come to their assistance.

In future, therefore, our task will be easy. Let us continue our assistance to agriculture, for it is that which supports all the others; let us recompense improvements in our manufactures, for they spread ease and competence among us; let us, in our endeavours, take commerce under our protection, for it is from it that springs the true organisation of labor; let us claim the blessing of education for all; and our duties being accomplished, we can meet, with calmness and security, the destiny that Providence, in its infinite wisdom, has reserved for our country.

Academy of Sciences, Paris.

ON THE CARBONIZATION OF WOOD BY MEANS OF HEATED STEAM.

BY M. VIOLETTE.

[Translated for the London Journal of Arts.]

CHARCOAL, as prepared and employed for the manufacture of various kinds of gunpowder, and more particularly for that used in sporting, differs essentially from pure charcoal, and contains other constituent parts of wood, the proportions of which vary according to the mode of preparation and the point at which the carbonization is arrested,—thereby modifying very much the quality of the powder; it is, consequently, carefully sorted into various qualities, varying from the first degree of carbonization, or red charcoal, to that which is completely carbonized, or black charcoal. Any process, by which uniform carbonization, of any desired degree, might be obtained, would therefore be attended with great advantages.

In the first part of my memoir, after pointing out the various kinds of charcoal, I have given an account of my experiments, made for the purpose of ascertaining the successive phenomena of carbonization in a closed vessel, and the effects obtained by exposing wood to various degrees of temperature. I have ascertained that, at a temperature of 200°, wood does not become carbonized; that, at 250°, a slight degree of carbonization is obtained; at 300°, *red* charcoal; and, at 350° and upwards, *black* charcoal is the invariable result. The time necessary for carbonization varies from three hours to half an hour, and the products pass progressively from the red to the black charcoal.

I next examined the product in carbon, which appeared to decrease as the carbonization proceeded.

In the second part of my memoir, I give an account of my labors, for the purpose of applying the principles (set forth in the first part) to carbonization by means of steam. MM. Thomas and Laurent, civil engineers, having conceived the idea of employing red-hot steam for the purpose of revivifying animal charcoal, I imagined that it was possible, from analogy, to apply that process to the carbonization of wood. I have found, from experiments made with a small apparatus (a drawing of which is annexed to my memoir), not only a slight degree of superiority as regards the strength of the powder, but also a much larger quantity of carbon. In consequence of this first result, the Minister of War granted me a sum of five thousand francs, for the purpose of setting up apparatus on a large scale, and carrying on the manufacture. In this apparatus the steam is supplied from an ordinary generator, and passes through a helical coil of pipe. This pipe is 20 millimetres (nearly an inch) internal diameter, and 20 metres (about 22 yards) in length. The steam, after being heated by the furnace, makes its exit at the required temperature (300°, for instance, to obtain red charcoal), and is made to surround a horizontal cylinder, which contains the wood—enters that cylinder, and carbonizes the wood; after which, it makes its exit from the cylinder, charged with the products of distillation. This apparatus has been continually at work for nearly a year, at the powder manufactory at Esquerdos, of which I have the management, and serves to manufacture all the powder required for sporting purposes.

According to the tables which I present of the results obtained in manufacture, it will be seen that I obtained generally from 33 to 37 per cent. of wood, or, on an average, 35 per cent., and 2 per cent. of imperfectly carbonized wood; but no portion of black charcoal. Sometimes the product was more than 39 per cent. of red charcoal.

The average product, obtained by means of the old processes, is 18 per cent. of red charcoal, and 14 per cent. of black. From this it will be seen, that the proportion of charcoal produced is twice as great by the new process as by the old. Black charcoal may also be easily produced, by raising the temperature of the steam above 300°. It is very important that the steam should be maintained at a certain temperature;—this is a feature very essential to the success of the operation, and it must be regulated with great nicety for this new mode of carbonization. The cost of manufacture is in favor of the new process.

I then point out some modifications, which, according to my observations, might be made in the construction of a new apparatus,—as that now in operation at the powder manufactory at Saint Chamas is found to work to the greatest advantage.

I afterwards enter into some details on the different quantities of charcoal to be put into the powder, according to the degree of carbonization and nature of the wood, as the charcoal may perhaps contain as much as two-fifths of volatile matters.

The quantities of the component parts are numerically the same in all powder manufactories; but it is not so really, as the charcoal employed, coming from different manufactories, is of variable quality. However, the exact analysis of different kinds of charcoal, which I am about to commence, will prove this; and I shall have the honor to present the result of my researches to the Academy.

I conclude, by making known to how much advantage heated steam might be employed for all purposes where a heat is required ranging between 100° and 500°.

Bread and sea biscuit may be well baked in a current of steam, heated to 200°. Successful experiments have recently been made upon this application of steam at Esquerdos, in the presence of an engineer, sent by the Minister of Marine. Bread may, by this means, be baked continuously, which has long been a desideratum. Meat may also be cooked by the same means; and there is reason to believe that cooking apparatus of this kind, either for large establishments or private individuals, may be used with advantage instead of the old apparatus *(marmite autoclave)*, which is attended with danger: there would be no danger attending the use of the steam apparatus, as the steam is at a very low pressure, *i. e.*, not more than a quarter or half an atmosphere above the pressure of the atmosphere.

The extraction of vinegar from wood may also be effected with equal facility by this new process; as on the one hand, the condensed steam will carry off and retain all the products of distillation without any loss; and on the other hand, the temperature suitable for obtaining the maximum quantity of acetic acid may be regulated by means of the induction steam-cock. It will, perhaps, also be possible to prevent the formation of the empyreumatic oil, which always accompanies wood vinegar, and is a distinguishing characteristic, which prevents it from being taken for wine vinegar. Alcohol may also by this means be advantageously extracted from wood, after having discovered the temperature, &c., most suitable for its production in greatest quantity.

In conclusion, I would observe, that wood may be dried by this means with great facility; and the novel and singular results which I have obtained respecting the resistance of different kinds of wood, dried at high temperatures, ranging from 100° to 150°, will form the subject of a memoir, which I intend shortly to submit to the Academy.—*Comtes rendus.*

NOVELTY OF INVENTION,

AS CONSIDERED UNDER THE BELGIAN PATENT LAWS.

From the extended intercourse existing at the present day among nations, we have great and peculiar advantages over any previous age; for we are enabled to avail ourselves of the thoughts of men who, having been educated under different influences, can have no prejudices in common, but must necessarily present a diversity of opinion, which is seldom found to result from a uniformity of training. When, therefore, we see the opinions of men of different nations coinciding, we naturally begin to feel that truth is upon their side; and further, if we find them zealously endeavouring to carry their views into practical operation, while no interest, but that of the public good, can be assigned for their exertions, we may rationally conclude, that the subject of their solicitude is a matter deserving consideration. It would seem then, that so wide spread is the feeling in favor of *the produce of intellectual labors being endowed with all the rights of personal property,* that it forms the impress of the present age. As Europe, in emerging from barbarism, had its crusade previous to acknowledging the rights of property, except when claimed by men who had the power to enforce them, so we have had our crusade against monopolies, as a prelude to the full acknowledgment of less tangible possessions, when unprotected by wealth and station. In our last number, we shewed that the Commissioner of Patents for the United States was exerting his influence with the government to obtain a more perfect recognition of the rights of American inventors; and, by the following communication of M. Jobard, we find that a Commission is sitting at Brussels, to inquire into the means of rendering the Patent Laws more efficient in Belgium. The point brought under discussion will, we think, be of interest to the reader, and serve to shew that at least one intelligent foreigner, who is fully able to judge of the matter, has not found it necessary, when speaking of the English laws, to stigmatize them (as too many inventors of late have done) as a mass of absurdities. M. Jobard's observations refer principally to the policy of retaining a regulation in the granting of patents, which has found its way into the laws of all countries except Great Britain. This is the rendering all patents invalid, when their subject matter, although unknown in practice, is discoverable in any printed work, of whatever language. The point in question is thus expressed:—

"CAN an invention found in an old publication be made the subject of a patent; and, supposing the patent to be granted, can it be annulled by the discovery of a similar or analogous description contained in a book printed in any other language?" This was the question appointed for discussion at the fourth sitting of the Commission; but it was not satisfactorily settled.

We shall be told, that all laws upon patents have admitted the above to be good grounds for annulling a patent, together with many others having as little sense in them; this arises from the fact, that all governments have considered patents inimical to the development of general industry; and that, consequently, it was necessary to cut them down as much as possible; and, after granting them with a bad grace, to take every opportunity of upsetting them.

The Belgic Commission having looked at the matter in another light, and considered patents to be *favorable to industry*, must, if it act consistently, set aside all reasons for refusal and avoidance, incompatible with the interests of the applicants and of the country, which, in fact, are identical,—whatever may be said to the contrary. It must, therefore, follow the example of the English practise, and consider every invention, which has not yet been worked in the kingdom, to be patentable, without regard to its origin. Whether an invention comes out of an old book, from a foreign country, or from the brain of the petitioner, matters little to the government; but it is of great importance to the government that a new invention, or branch of industry, be introduced into the country, as it occasions the use of material, and the employment of both mental and bodily labor; while it enriches the catalogue of objects of exportation, and causes national labor to be exchanged for gold and foreign produce. For these reasons, the English law requires no examination of inventions, and rejects no applications for patents; but causes them to be defended in a very efficient manner against infringers, by proper tribunals, where it would be considered ridiculous if an infringer pleaded the publication of the invention under dispute in a Chinese or Japanese encyclopædia. This is however admitted in all continental patent laws.—It is only necessary to produce a description, written *in any language*, in order to destroy the right of a patentee, whatever expenses he may have incurred in obtaining and working the patent; and it is this which renders capitalists so distrustful in patent matters, and prevents inventors from finding partners for even the best inventions,—even supposing the patents to be at that time well secured.

This serious evil in patent law exists also in America, and has brought forth complaints from the Commissioner of Patents, who calls for a revision of these unjust laws, which were made from fear of monopoly. If the examining committees were responsible—if, at the same time that they have the power of refusing patents, those which they decided upon granting were pronounced impregnable, one could understand the utility of preliminary examinations and searches; but this is not the case; and patents are always granted without guarantee from the government;—the examination therefore goes for nothing; and it is sufficient, we repeat, to bring forward a Russian, Turkish, Magian, or Persian book, in order to ruin an inventor, who may really have been an original discoverer, and never have seen the book in question. That there is nothing new under the sun is a truth that is never denied;—people do not really invent; but, by study and reflection, combine or apply anew; and it is as true that every book is in all books, as that every invention is in all inventions,—which does not, however, prevent hundreds of new books appearing daily, the property of which is not contested with the authors for, at least, a much longer time than is granted to inventors in the arts and manufactures. Why is not the advantage equal for all? Why refuse similar rights for all kinds of inventions? Can it be reasonably supposed, that it is more difficult to distinguish one loom from another, than one book from another? The contrary is most likely to be the case; and yet trials for plagiarism are very rare and easily decided.

We have many proofs that, by making diligent search, all inventions might be discovered, by going back to the ancient Greeks, the Arabs, and the Copts, and, more especially, by consulting the thirty thousand volumes of the Chinese encyclopædia. We wish to be understood by this to say, that they would be found pointed out in a manner sufficiently clear to enable a person, skilled in the branch of industry to which they refer, to put them in execution, which is the condition required by the patent law; there are, however, not many which have been practically worked, as the mere publication of them would be an obstacle. For example:—112 years ago Reaumur published the art of rendering cast-iron malleable; for this reason, it could not be patented in France, and has never been worked in that country. But this invention was patented in England, although published by Reaumur, and has been very extensively worked in that country, at Sheffield and Birmingham.

The devitrification of glass, also published by Reaumur, has remained hidden in his book, with many other valuable matters.

The gearing pump, commonly called the French pump, was invented by M. Delatouche, who was about taking a patent, when he learned that Cavé had invented it before him. Cavé informed him that, at the time of taking his patent, he heard of its existence in England, which prevented his working it on a large scale. A fourth inventor, having re-invented it, took a patent, and commenced working it advantageously, when it was discovered that it was described in an old plumber's manual, printed about 100 years before. This was sufficient to put a stop, either partially or wholly, to its working; and it will soon disappear, like all inventions, which, from the same cause, have become public property.

Gun cotton appeared to be quite a novel invention when first introduced; but, lo! it was found to have been mentioned fifteen years before in Legris' six thousand inventions, to which the Society of Encouragement lent its support on that occasion.

If Seissel's asphalte pavement could have been patented, it would have been of the greatest utility; but the receipt having been published, it became a subject for public competition,—each invented his asphalte; and, as each succeeding sort was a further departure from the excellent original, the public confounded all these compositions produced under the same name, and condemned asphalte accordingly; it has thus disappeared from the field of industry, with its ten or a dozen modifications.

Marine glue was an excellent invention; but as the receipt existed in an English book, it could not form the subject of a patent according to our laws. Marine glue has therefore been unemployed as well as asphalte.

De Lille's wood-paving not being the subject of an exclusive patent, many competing plans were put forth, but at gradually diminishing prices, which necessarily produced the same results; wood-paving has consequently shared the same fate as asphalte.

Trade spoilers are so numerous that, as soon as they find means, they pounce upon the most valuable inventions, and they are lost. These men may be compared to wasps in an orchard, always attacking the finest fruit.

This lack of security to industry keeps back a large amount of capital,—very few care to undertake any new manufacture; there is a species of panic spread over all the countries called countries of liberty, where the large capitalists are at liberty to oppress the small ones, and one another, even to destruction,—to the great delight of the apostles of industrial anarchy, whose doctrines have been at length annihilated at those barricades which they had manned with famished combatants.

This was required to open the eyes of those who preached the doctrine of universal freedom of action.—Let us hope that this proof will suffice to convince the world of the necessity of bringing labor into something like order,—in fact to organise that which is at present in a state of disorganisation, by sanctioning this great principle of justice—*To every one the property and responsibility of his work!* JOBARD.

It is scarcely likely that the feeling which has of late been spreading in favor of the claims of inventors should subside without some substantial benefits accruing to them. If, then, we should be late in discovering the means of amending our own laws relating to patents, from the opposition of the holders of sinecure offices on the one hand, and the wild and contradictory notions which many inventors would propose on the other, yet there is little doubt other countries will shortly revise their laws, and by their example draw us into action. To be prepared with well-studied proposals that may assist in the perfecting of our patent laws, has long been our aim; but to introduce unanimity of opinion amongst inventors is an essential condition, before we can hope for sound legislation on this subject: we shall therefore, as opportunity serves, recur to the experience of other countries; and we may finally perhaps set forth the principles on which alone (in our opinion) the system of granting patents can be fairly based.

Electrical Condition, applied to facts connected with Heat, Crystallisation, Meteorology, &c.—By Franklin Coxworthy. Pierce, 310, Strand.

A little pamphlet, with the above title, had nearly escaped our notice, from its unpretending appearance; but, on examination, we think it deserving the attention of scientific speculators,—a class of men, by the way, whose exertions are too little regarded, although, like their prototype, the mole, they frequently burrow through very stiff ground, and render it available for practical purposes. In giving our readers a clear notion of Mr. Coxworthy's theory, we find it difficult to select parts to suit our purpose, and yet preserve the connection of the argument; but we will make the attempt, fearful nevertheless that we may unconsciously add to his pleasure by marring his arguments and making them ridiculous;—for, if we may judge from his pamphlet, he appears to be one of that peculiar genus, rarely to be found among philosophers, who would heartily exclaim with Mawworm, "Ay, do despise me, I'm the prouder for it; I likes to be despised." To return to the theory, our author says:—

"The intention of the present inquiry being to establish certain principles by which to connect the sciences, we shall confine our observations, as nearly as possible, to a simple detail of facts, most of which have long been acknowledged, but, to be clearly understood, required the addition of those which have recently been brought to light.

"Before the day of Galileo, on facts apparently of an unquestionable character, it was determined that the sun revolved round the earth; and similar outward appearances, connected with electrical science, have induced the belief that electricity is identified with heat, and that cold is merely the absence of heat; but we shall endeavour to shew that *cold* is the positive condition of electricity, and that *heat* is the negative state.

"It has long been known that the atmosphere is cold in proportion to the distance from the earth—a fact, however, in no way calculated to disturb present notions, since the earth is considered to be the source of heat, and, therefore, of electricity; and although the evidence afforded by Professor Leslie with the ethrioscope—which, to use his own words, when exposed to the open air in clear weather, 'indicated an impression of cold shot downwards from the higher regions'—much engaged the attention of philosophers; still, standing alone, it was little calculated to exercise an influence in diverting the stream that so long had directed our course.

"Now, however, the case is altogether different; we have the testimony of philosophers, whose character is a guarantee for the correctness of their conclusions, not only that the atmosphere is positively electric as compared to the earth, but also that the electric condition increases with the increase of altitude, and, therefore, with the increase of cold."

The experiments carried on by Messrs. Cross and Weekes, for ascertaining the direction of electric currents, are cited to shew that "the air is only constantly *positive* in relation to the earth during the prevalence of bright skies;" and the indication, by Dr. Wollaston's ethrioscope, of the impression of cold being shot down from the upper regions under similar circumstances, is adduced, with other evidence, to prove that "cold is material, and therefore something more than the absence of heat." Next follows the author's experiments on crystallisation, the object of which will be understood from the result, and the inferences he draws therefrom as shewn in the following paragraph:—

"Of the influence ef electricity, however, in causing crystallisation, or the combination of matter, we have already afforded evidence, and a salt subjected to the action of heat, although in a cold saturated solution, decrystallises or dissolves; there can, therefore, be nothing irrational in the supposition that electricity is the bond of union in matter, and that heat is the opposite or negative condition."

He then proceeds to apply the subject-matter of his reading and experiences, and to draw forth, with considerable ability, a conclusion altogether irreconcileable with the notions at present held on the causes of certain atmospheric phenomena. The following extract, somewhat condensed, will sufficiently explain the author's theory:—

"Many years since, whilst engaged in an investigation on the decomposition of organic matter, the results satisfied us that the hydrogen of vegetable matter, under the influence of free oxygen, was wholly converted into light carburetted hydrogen, which escapes into the upper regions; and it occurred to us, at the time, that the doctrine of the diffusion of gases, and received principles of meteorology, in no way accounted for the restoration of this gas to the earth.

"So startling a fact brought us to a stand; and, ultimately, we observed that snow was deposited on the tops of mountains at least a mile and a half above the point of eternal frost; which point vapour certainly never could attain—that clouds were, at times, positively black by reflected light, vapour being always white; together with a host of other facts equally subversive of present doctrines; and we will now proceed to inquire whether a system cannot be devised that shall be free from objection on the part of nature; and, if in this we can succeed, however strongly prejudice may have taken root in favor of present notions, we feel well assured that it must ultimately succumb to truth.

"The utmost man can accomplish, is to call into operation certain functions in existence in nature.

"We have already seen that, through the agency of fire, a certain effect is produced on water, corresponding to that of the influence of the heat of the earth, or negative condition; but it is obvious that there is also another condition in operation in nature, corresponding to that of the galvanic battery, otherwise the battery could not possess the property of rendering water into the 'gasiform' condition; a condition under which the elements of water readily pass the point of eternal frost in the atmosphere without condensation; and the evaporation of ice, crystallised water, and the fact that electricity increases the evaporation of water, shew that there is such a principle in the atmosphere.

"We need scarcely direct attention to the vast amount of carburetted hydrogen that is hourly escaping from the earth's surface, in what is commonly known as burning springs, and as fire damp of the coal mines; in addition to which all the vegetable matter decomposed under the influence of oxygen in water yields its hydrogen as a light carburet; and it has long been known that the air of river water contains a greater amount of oxygen than enters into the constitution of atmospheric air, which free oxygen, we conceive, is derived from vegetation, and being of greater specific gravity, and much more soluble in water [illegible] air, is, in every respect, calculated to effect the decomposition of [illegible]er in water.

By combustion and respiration, carbon combines with oxygen in the proportion of 6 to 16; therefore, for every six pounds of carbon converted into carbonic acid, there must be abstracted from the air sixteen pounds of oxygen: but the air is a compound of 1 of oxygen to 4 of nitrogen, and, therefore, for every sixteen pounds of oxygen abstracted, there must be about sixty pounds of nitrogen liberated, or as 10 to 1 of the carbon consumed, whether by combustion or respiration, and therefore falling little short, if not exceeding, the amazing bulk of FIVE HUNDRED MILLION TONS annually in this country alone; and which, from its specific gravity, and loss of weight imparted to it by high temperature, or increased negative condition, must pass off into the upper regions.

"There must, therefore, be constantly passing off to the upper regions of the atmosphere the

$$\left.\begin{array}{ll}
\text{Gases of vapour} \ldots\ldots & \left\{\begin{array}{l}\text{Oxygen}\\ \text{Hydrogen}\end{array}\right\}\text{Water}\\
\text{Carburetted hydrogen}\ldots & \left\{\begin{array}{l}\text{Carbon}\\ \text{Hydrogen}\end{array}\right.\\
\text{Nitrogen}\ldots\ldots\ldots\ldots & \quad\text{Nitrogen}\;\Big\}\text{Ammonia}
\end{array}\right\}\text{and together}$$

form a compound, snow, which, on its decrystallisation, resolves itself into water, ammonia, and carbon; and we are informed, by no less an authority than Liebig, that both snow and rain-water invariably contain ammonia; and that rain always leaves its black cloud behind, whilst snow never does, is sufficiently evident. It is also well known to farmers that a heavy fall of snow does the ground as much good as a dressing of manure.

"It must also be obvious that if gases, like all other matter, be subservient to the law of gravitation, and which nature proclaims them to be, the oxygen abstracted from the atmosphere, by combustion and respiration, cannot be restored by diffusion, as is supposed to be the case; but that trees and other vegetable productions not requiring ammonia for their growth must regenerate the air by the decomposition of water, carbonic acid, and ammonia, and the appropriation to themselves of the hydrogen and carbon, and a small portion of the oxygen; the nitrogen of the ammonia combining with the liberated oxygen, under the influence of the electrical condition of the tree or plant.

"In departing from the fallacies of one system, man is naturally prone to fall into others; when, therefore, the above important facts presented themselves to our notice, we came to the conclusion that the whole of the rain that fell was first formed into snow; information, however, which we have since acquired, leads to the inference that it may *likewise* be referable to the condensation of vapour." * * *

"Snow, however, during decrystallisation, yields free electricity; a snow cloud, therefore, from which rain is falling, must be positive; but carbon being one of the constituents of snow, and being left above during rain, constitutes the negative cloud; and the negative condition is increased by the subsequent transformation of the carbon into the white matter constituting the 'cumulus,' which certainly cannot be composed of vapour, because, if vapour, it must either undergo condensation or evaporation.

"Samples of snow-water, which were sent from Scotland, contained, when they reached us, black matter, which black matter ultimately changed into white matter of much larger bulk; and although we have made numerous attempts to obtain snow-water free from solid matter, we have as yet invariably found it to contain about the same proportion, as near as the eye will determine; and a short time after having put a little carbonate of ammonia into a bottle of snow-water, obtained near the five-mile stone on the Harrow-road (from which direction the wind had previously been blowing several days), a beautiful, and even luxuriant, verdure covered the bottom of the bottle.

"Mr. Charles Green, whose practical information on this subject cannot be too highly appreciated, states, 'On two occasions I have passed through thunder clouds which resembled dense black smoke, and from which fell torrents of rain and hail,' and 'the clouds cumulus are much more luminous; and I have often experienced fine snow falling from them during the summer months. *This snow very much resembles dry salt or dust of loaf sugar.* They appear, in passing through them, to be composed of white vapour only.' Mr. Green at first considered this matter to be nothing but frozen moisture on the balloon; but by letter, dated 27th October, 1845, he observes, 'The fine snow alluded to in reply to your second question could not have been caused wholly by the frozen moisture of the balloon, as I have observed it several times, during an ascent in the month of June, extending in every direction as far as the eye could discern; and where the rays of the sun acted on it through the openings of the clouds above (from which, I think, it must have fallen) it had a pleasing appearance, resembling a shower of small diamonds, or silver dust, with which my companions were much delighted.'

"If pure snow be carefully collected with a clean silver spoon, and compressed into a clean white preserve jar, on the snow thawing, a beautiful black film will be observed on the surface of the water; which film will ultimately form a black ring round the interior of the jar, possessing all the characters of carbon deposited under chemical action; and in the water will be seen, when put into a bottle, the white filamentous matter already referred to.

"If, then, there be no flaw in the evidence which we have adduced of the relative electrical condition of the earth and atmosphere, the cause of the magnetic condition of the earth, and of gravitation, is so self-evident, as scarcely to require a word in elucidation.

"Whether an electric current be made to revolve round a bar of iron, or the bar to revolve in an electric atmosphere, the effect is the same —the bar is thrown into the magnetic state.

"The earth, we are told, is hottest at the centre; and, therefore, that point must be the extreme of electrical *negative* condition; and as we know the atmosphere to be cold, in proportion to the distance from the earth, there must be some point where exists the extreme electrical *positive* condition.

"An apparatus, which we have had in operation since October, 1845, indicates pretty clearly, that the atmosphere IN WHICH WE MOVE, is sometimes *positive*, and sometimes *negative*, as compared to the earth.

"This, then, may be regarded as the central point of electrical condition; and as the surface of the earth is at 4,000 miles from the centre or extreme negative, it is self-evident that the extreme positive must be at an equal distance.

"If we allow a loss of temperature of about 15° or 16° for every mile of distance from the earth's surface, it will give for 4000 miles, a cold or high electrical condition of about 60,000° below 32° of Fahrenheit, the opposite condition of which will represent the temperature of the centre of the earth; and which, so far as the imagination will enable us to comprehend the matter, is not much at variance with that which has been assigned to it, on mathematical calculation.

"The earth, then, which may be regarded as a bar of iron, revolves in a highly electric atmosphere, and must, therefore, necessarily have one of its poles thrown into the magnetic state.

"If, then, there be such powerful electrical agencies in the earth and the atmosphere,—and bodies, under certain circumstances, similarly electrified, repel each other,—dissimilarly electrified, attract each other, we have no difficulty in assigning a cause to gravitation.

"The application of this principle to the electrical condition of the gases, will infallibly reverse the electrical arrangement given in chemical works. * * * * *

"At a point in the atmosphere decrystallisation takes place, and if the thawing of the mass yield more electricity than the rain formed can convey to the earth, the natural consequence is the formation of the flash of lightning; the cloud, then, from which this flash proceeds is in a positive state, and if there be within its influence a white cloud or mass of vegetating matter requiring electricity, the lightning will fly to it; but if not, or the earth be more within its influence, it naturally travels to the ground, its attraction being obviously *not referable to weight.*"

Although in the above extracts we have absorbed the greater portion of the pamphlet, we think the author would require from us no apology on that score; our object has been to make known what—to say the least of it—is a most ingenious theory, relating to a string of subjects, each one of which would well repay a lengthened consideration. To the truth of his deductions it is not in our province to speak,—that we must leave to the scientific recluse, whose time and abilities could not be better engaged than to determine the points our author has brought forward.

LIST OF REGISTRATIONS EFFECTED UNDER THE ACT FOR PROTECTING NEW AND ORIGINAL DESIGNS FOR ARTICLES OF UTILITY.

1848.

June 28. *Frederick Harris,* of 7, Silver-street, Wood-street, London, for a ticket pin.

29. *Henry Dunnington,* of Nottingham, for a hat band.

30. *Francis Willets Bassano,* of Birmingham, for a roof lamp.

July 1. *Robert & Francis Grassby,* of Martin, Hull, iron and brass founders and thrashing machine makers, for a thrashing machine.

1. *Davidson & Armstrong,* of Piccadilly, Manchester, for a spindle-valve for pumps.

1. *Arthur Hill Holme,* of 4, Benson-street, Liverpool, architect, for an improved safety-valve box for steam-boilers; by means of which, a deficiency in the supply of water, or a surplus in the pressure of steam, is indicated by an alarm whistle.

1. *William Hill,* of the Horticultural Works, Greenwich, for an improved flue boiler.

4. *Henry John Fry,* of 31, Markham-street, Chelsea, Middlesex, and *William Downs Phipps,* of Cadogan

House, Sloane-street, Chelsea, Middlesex, for an improved elastic spring boot.

July 4. *Charles Maiben*, of 25, Warren-street, Fitzroy-square, London, saddler, for a saddle.

4. *Woods & Thomas*, of 94, Cheapside, hook, eye, and needle manufacturers, for a secure hook and flexible dress fastener.

5. *Charles Greenway*, of 72, Park-street, Grosvenor-square, for a stock.

7. *Richard Restell*, of 35, High-street, Croydon, watchmaker, for a cylindrical brooch protector.

10. *George Frederick Morrell*, of 49, Fleet-street, for a flower and plant label.

11. *John Sparks*, of 12, King-street, Tower Hill, builder, for a railway despatch and cash box.

12. *William N. Nicholson*, of Newark-on-Trent, for "the improved Newark cottage range."

12. *William Bullock Tibbits*, of Braunston, Northamptonshire, for a spring holdfast for window sashes.

12. *William Rawlings Sobey*, of 1, Queen-street, Exeter, for a spring lock for a brooch.

13. *Gilbert Dickenson*, of 114, New Bond-street, lithographer and publisher, for "the artist's vade mecum."

13. *John Edward Smith & Co.*, of 5½, Lawrence-lane, London, for a shirt collar.

13. *Charles Warren*, of Birmingham, for a fastener for brooch.

14. *Richard Clark*, of 447, West Strand, and *Thomas Restell*, of 12, York-terrace, Camberwell New Road, for a pressure cullender for vegetables.

14. *Fountain John Hartley*, of 21, Pump-row, Old-st.-road, Middlesex, for a fastener for umbrellas, parasols, &c.

14. *Foster Porter & Co.*, of 124, Wood-street, Cheapside, London, for a Victorine.

15. *Thomas Heming*, of 22, High-street, Maidstone, Kent, for a shooting coat and waistcoat, combined.

15. *Barnett Meyers*, of 18, Crutched-friars, for a mitred handle for walking umbrella and cane, &c.

17. *George Josiah Mackclean*, of Lechlade, Gloucestershire, for a thrashing machine.

17. *White & Wells*, of Nottingham, hosiers, for an under shirt.

18. *Thomas Edwards*, of 169, Broad-street, Birmingham, cigar case maker, for improvements in solid leather cigar cases.

19. *George Unite*, of Birmingham, for a slide bolt to secure the pins of brooches.

19. *Weiss & Son*, of the Strand, surgical instrument makers, for a forceps and scissors joint.

21. *Pretyman & Hobson*, of Cornhill, for a child's cot.

July 21. *Samuel Alfred Carpenter*, of 43, Temple-street, Birmingham, for a wedge adjuster.

22. *Samuel Minshall*, of Birmingham, for a hearse, to be drawn by hand.

24. *James Rowland*, of 23, New Bond-street, and *William Rich* & *Robert Harris*, of 13, Swallow-street, for "the Aptandum trowsers."

25. *W.* & *F. Thorn*, of 10, John-street, Cavendish-square, coach builders, for "the Æquimotive spring."

25. *R. W. Winfield*, of Birmingham, for a gas burner.

25. *Stock* & *Sharp*, of Birmingham, for "the brilliant and economic perforated disc gas burner."

26. *James Hirst Whitehead*, of Jekley, near Leeds, for an improved stove back.

List of Patents

That have passed the Great Seal of IRELAND, from the 17*th June, to the* 17*th July*, 1848, *inclusive.*

To Robert Wilson, of Greenock, North Britain, Master of Arts, for improvements in certain kinds of rotatory engines worked by steam or other elastic fluids; part of which improvements are applicable to rotatory engines worked by water, or by wind; also an improvement in safety-valves for steam-boilers. —Sealed 22nd June.

William Beckett Johnson, of Liverpool, county of Lancaster, engineer, for certain improvements which are applicable to locomotive, stationary, and marine steam-engines.—Sealed 6th July.

David Williams Wire, of No. 9, St. Swithin's-lane, in the city of London, Gent., for an improved manufacture of candles, and other like articles used for affording light,—being a foreign communication.—Sealed 10th July.

List of Patents

Granted for SCOTLAND, subsequent to June 22nd, 1848.

To Jasper Wheeler Rogers, of Nottingham-street, Dublin, civil engineer, for certain improved methods and machinery for the preparation of peat as fuel, and in combination with certain substances as a compost or manure.—Sealed 26th June.

Pierre Armand Le Comte de Fontainemoreau, of No. 4, South-street, Finsbury, for certain improvements in the process and machinery for making, uniting, and preserving metallic and other tubes or pipes,—being a foreign communication.—Sealed 26th June.

George Beattie, of Edinburgh, builder and wood merchant, for an improved air-spring and atmospheric resisting power.—Sealed 29th June.

Thomas Dalton, of Coventry, silk dyer, for improvements in the manufacture of fringes, gimps, and bullions.—Sealed 29th June.

Matthew Townsend, of Leicester, frame-work knitter, for improvements in the manufacture of looped or knitted fabrics.—Sealed 29th June.

Frederick William Mowbray, of Leicester, paper dealer, for improvements in machinery for the manufacture of looped fabrics.—Sealed 29th June.

Charles Low, of Roseberry-place, Dalston, Middlesex, for improvements in the manufacture of copper.—Sealed 29th June.

Richard Wrighton, of Lower Brook-street, Grosvenor-square, London, for improvements in apparatus to be applied to railway-carriages and engines.—Sealed 3rd July.

Richard Clarke Burleigh, of Featherstone-buildings, London, for improvements in burners for obtaining or producing light and heat, and in apparatus to be used therewith.—Sealed 6th July.

Sidney Edwards Morse, of Ampton-place, Gray's-inn-road, London, for improvements in the manufacture of plates or surfaces for printing or embossing.—Sealed 10th July.

John Martin, of Killyleagh Mills, county of Down, manufacturer, for improvements in preparing and dressing flax, tow, and other fibrous substances; and in doubling, drawing, and twisting flax, tow, and other fibrous substances; and in the machinery to be used for such purposes.—Sealed 14th July.

Alexander Mc Dougall, of Longsight, Lancashire, chemist, for improvements in the manufacture of glue, and in treating products obtained in the manufacture of glue.—Sealed 18th July.

Robert Heath, of Heathfield, near Manchester, for certain improvements in the method of applying and working friction-brakes to engines and carriages to be used upon railways.—Sealed 18th July.

New Patents
SEALED IN ENGLAND.
1848.

To Joseph Skertchley, of Anstey, in the county of Leicester, Gent., for improvements in bricks, and in the manufacture of tobacco-pipes and other like articles. Sealed 30th June—6 months for inrolment.

Elizabeth Dakin, of St. Paul's Church-yard, in the city of London, widow, for improvements in cleaning and roasting coffee; in the apparatus and machinery to be used therein; and also in the apparatus for making infusions and decoctions of coffee;—being a communication from her late husband. Sealed 3rd July—2 months for inrolment.

Nathaniel Beardmore, of Great College-street, Westminster, civil engineer, for certain improvements in founding and constructing walls, piers, and breakwaters; parts of which improvements are applicable to other structures. Sealed 3rd July—6 months for inrolment.

George Beattie, of Edinburgh, builder and wood merchant, for an improved air-spring and atmospheric resisting power. Sealed 6th July—6 months for inrolment.

John Martin, of Killyleagh Mills, in the county of Down, Ireland, for improvements in preparing and dressing flax, tow, and other fibrous substances; and in doubling, drawing, and twisting flax, tow, and other fibrous substances; and in the machinery to be used for such purposes. Sealed 6th July—6 month for inrolment.

Enoch Steel and William Britter, both of Lambeth, Surrey, manufacturers, for improvements in the manufacture of tobacco-pipes. Sealed 6th July—6 months for inrolment.

Joseph Clinton Robertson, of Fleet-street, in the city of London, civil engineer, for improvements in the manufacture of gas for illumination, and of the residual products into articles of commerce,—being a communication. Sealed 6th July—6 months for inrolment.

William Edward Newton, of the Office for Patents, 66, Chancery-lane, Middlesex, civil engineer, for improvements in the construction of stoves, grates, furnaces, or fire-places, for various useful purposes,—being a communication. Sealed 6th July—6 months for inrolment.

Walter Orbell Palmer, of Southacre, near Swaffham, Norfolk, farmer, for improvements in machinery for thrashing and dressing corn. Sealed 10th July—6 months for inrolment.

Anthony Lorimier, of Bell's-buildings, Salisbury-square, in the city of London, book-binder, for improvements in combining gutta-percha and caoutchouc with other materials. Sealed 10th July—6 months for inrolment.

Richard Roberts, of the Globe Works, Manchester, engineer, for certain improvements in and applicable to clocks and other time-keepers; in machinery or apparatus for winding clocks and hoisting weights; and for effecting telegraphic communications between distant clocks and places otherwise than by electro-magnetism. Sealed 11th July—6 months for inrolment.

Leon Castelain, of Poulton-square, Middlesex, chemist, for improvements in the manufacture of soap. Sealed 11th July—6 months for inrolment.

Felix Alexander Testud de Beauregard, of Paris, engineer, for improvements in generating steam, and in the means of obtaining power from steam-engines. Sealed 11th July—6 months for inrolment.

Mathew Kirtley, of Derby, engineer, for improvements in the manufacture of railway wheels. Sealed 11th July—6 months for inrolment.

Jesse Ross, of Leicester, agent, for improvements in apparatus for dibbling and other agricultural purposes; part of which improvements are applicable to propelling vessels. Sealed 11th July—6 months for inrolment.

William Edwards Staite, of Lombard-street, London, Gent., for improvements in the construction of galvanic batteries, in the formation of magnets, and in the application of electricity and magnetism, for the purpose of lighting and signalizing; as also a mode or modes of employing the said galvanic batteries, or some of them, for the purpose of obtaining chemical products,—being partly a communication. Sealed 12th July—6 months for inrolment.

William Swain, of Pembridge, Herefordshire, brick-maker, for certain improvements in kilns for burning bricks, tiles, and other earthen substances. Sealed 18th July—6 months for inrolment.

Jean Louis Lamenaude, of No. 30, Passage Touffroy, Paris, for a new process of applying or fixing letters of metal upon glass, marble, wood, and other substances. Sealed 18th July—2 months for inrolment.

Charles Purnell, of Liverpool, dock master, for certain improved apparatus to be applied to timber-loaded and other vessels laden with materials, the specific gravity of which is lighter than water,—preventing the necessity of abandoning them at sea, by ridding them of the superincumbent water, and enabling them thereby to carry sail. Sealed 18th July—6 months for inrolment.

William Edward Newton, of the Office for Patents, 66, Chancery-lane, Middlesex, for certain improvements in machinery for letter-press printing,—being a communication. Sealed 18th July—6 months for inrolment.

Joseph Stenson, of Northampton, engineer, for improvements in steam-engines and boilers; parts of which improvements are also applicable to other motive machinery. Sealed 18th July —6 months for inrolment.

Joham Arnold Steinkamp, of Leicester-street, Leicester-square, Middlesex, Gent., for improvements in the manufacture of sugar from the cane, and in refining raw sugar. Sealed 18th July—6 months for inrolment.

Chevalier Alexandre Edouard Le Molt, of Conduit-street, Middlesex, for certain improvements in apparatus for lighting by electricity; parts of which may be made use of in other applications of electricity. Sealed 20th July—6 months for inrolment.

David Napier and James Murdock Napier, both of York-road, Lambeth, Surrey, engineers, for improvements in mariners' compasses, also in barometers, and in certain other measuring instruments. Sealed 20th July—6 months for inrolment.

William Thomas, of Cheapside, London, merchant, for improvements in the manufacture of stays, boots, and shoes; also in fastening and connecting fabrics and garments. Sealed 26th July—6 months for inrolment.

John King, foreman to Messrs. Shears and Sons, of Bankside, and Henry Medhurst, operative chemist to the said Messrs. Shears and Sons, for improvements in gas-meters. Sealed 26th July—6 months for inrolment.

Disclaimer and Amendment
OF PART OF AN INVENTION
MADE UNDER LORD BROUGHAM'S ACT.

Disclaimer, filed with the Clerk of the Patents for England, on the 17th July, 1848, to the specification of a patent granted to Samuel Cunliffe Lister, for "improvements in stopping railway trains and other carriages, and generally where a lifting power or pressure is required," bearing date at Westminster the 18th of January, 1848,—whereby he disclaims, in the title thereof, the words, "*and other carriages, and generally where a lifting power or pressure is required.*"

CELESTIAL PHENOMENA FOR AUGUST, 1848.

D.	H.	M.	
1			Clock before the ☉ 6m. 0s.
—			☽ rises 6h. 57m. M.
—			☽ passes mer. 1h. 52m. A.
—			☽ sets 8h. 36m. A.
5			Clock before the ☉ 5m. 41s.
—			☽ rises 11h. 19m. M.
—			☽ passes mer. 4h. 50m. A.
—			☽ sets 10h. 14m. A.
6	10		☽ in Apogee
7	2	57	☽ in □ or first quarter
7	15	39	☿ greatest elong. 18. 57. W.
10			Clock before the ☉ 5m. 3s.
—			☽ rises 4h. 14m. A.
—			☽ passes mer. 8h. 42m. A.
—			☽ sets 0h. 23m. M.
12	23	12	☿ in the ascending node
14	8	16	Ecliptic oppo. or ○ full moon
15			Clock before the ☉ 4m. 11s.
—			☽ rises 7h. 34m. A.
—			☽ passes mer. 0h. 9m. M.
—			☽ sets 5h. 24m. M.
15	5	35	☿ in conj. with ♃ diff. of dec. 0. 1. N.
16	16	35	♄ in conj. with the ☽ diff. of dec. 2. 14. S.
17	12	48	☿ in Perihelion
18	13	16	♅ in conj. with the ☽ diff. of dec. 2. 6. N.
	18		☽ in Perigee
19	5	8	☿ greatest hel. lat. N.
20			Mercury R. A. 9h. 11m. dec. 17. 29. N.
—			Venus R. A. 10h. 31m. dec. 10. 51. N.
—			Mars R. A. 11h. 10m. dec. 6. 18. N.
—			Vesta R. A. 0h. 29m. dec. 8. 12. S.
—			Juno R. A. 4h. 26m. dec. 11. 39. N.
—			Pallas R. A. 12h. 56m. dec. 11. 9. N.
—			Ceres R. A. 13h. 4m. dec. 0. 23. N.
—			Jupiter R. A. 8h. 41m. dec. 18. 48. N.
20			Saturn R. A. 23h. 40m. dec. 4. 41. S.
—			Georg. R. A. 1h. 22m. dec. 8. 0. N.
—			Mercury passes mer. 23h. 19m.
—			Venus passes mer. 0h. 35m.
—			Mars passes mer. 1h. 14m.
—			Jupiter passes mer. 22h. 42m.
—			Saturn passes mer. 13h. 42m.
—			Georg. passes mer. 15h. 24m.
—			Clock before the ☉ 3m. 6s.
—			☽ rises 10h. 5m. A.
—			☽ passes mer. 4h. 31m. M.
—			☽ sets 11h. 43m. M.
21			Occul. γ Tauri, im. 11h. 27m. em. 12h. 18m.
—			Occul. θ^1 Tauri, im. 15h. 18m. em. 16h. 26m.
—			Occul. θ^2 Tauri, im. 15h. 23m. em. 16h. 20m.
21	4	8	☽ in □ or last quarter
—			Occul. A. S. C. 516, im. 16h. 24m. em. 17h. 35m.
—			Occul. α Tauri, im. 19h. 30m. em. 20h. 30m.
22			Occul. 111 Tauri, im. 14h. 2m. em. 14h. 53m.
—			Occul. 117 Tauri, im. 15h. 37m. em. 16h. 37m.
24			Occul. λ Geminorum, im. 13h. 8m. em. 13h. 49m.
25			Clock before the sun 1m. 49s.
—			☽ rises 1h. 21m. M.
—			☽ passes mer. 9h. 10m. M.
—			☽ sets 4h. 55m. A.
26	8	26	♃ in conj. with the ☽ diff. of dec. 4. 7. N.
27	20	41	☿ greatest hel. lat. N
28			☉ eclipsed, invis. at Greenwich
	0	45	☿ in conj. with the ☽ diff. of dec. 3. 46. N.
	7	1	Ecliptic conj. or ● new moon.
29	5	48	♀ in conj. with the ☽ diff. of dec. 1. 54. N.
	15	32	♂ in conj. with the ☽ diff. of dec. 0. 49. N.

The Satellites are not visible until the 20th day of this month, Jupiter being too near the Sun.

J. LEWTHWAITE, Rotherhithe.

THE
LONDON JOURNAL,
AND
REPERTORY
OF
Arts, Sciences, and Manufactures.

CONJOINED SERIES.

No. CCI.

RECENT PATENTS.

To George Winslow, *now of Boston, in the State of Massachusetts and United States of America, merchant, but late of Burton Crescent, in the county of Middlesex, for an invention of improvements in machinery for manufacturing files and rasps,—being a communication.*—[Sealed 3rd July, 1847.]

This invention consists in a peculiar arrangement or construction of mechanism for cutting or forming the teeth of files and rasps by the pressure of suitably formed chisels upon the file or rasp blank, instead of effecting the operation by a series of blows. The degree of pressure of the chisels is regulated to suit the varied thickness of the file or rasp, and thus a uniform and proper depth of cut is insured for all the teeth.

In Plate IV., fig. 1, represents the improved machine in plan view; fig. 2, is a side elevation of the same; fig. 3, is a vertical, central, and longitudinal section; fig. 4, is an elevation of the front end of the machine; and fig. 5, is a view of the back or rear end thereof, partly in section, the better to shew the construction of the various parts. a, is the framing of the machine, made of wood or other material of suitable strength to sustain the parts hereinafter described; b, is the main shaft, through which motion is communicated from any suitable motive power to the operative parts of the machine. This shaft is mounted in bearings at the front end of the machine, as shewn in fig. 4; and on its outer end a fly-wheel C, provided at its boss with a clutch-box, is mounted loosely. To the inner end of this shaft a circular disc or plate D, is keyed; and in this disc a long radial slot E, is formed, for the purpose of receiving a crank-pin F, which forms a coupling-joint between a connecting-rod or sweep G, and the disc D, and may be adjusted to any required radius of that disc, to alter the throw of the connecting-rod. This rod or sweep G, is also attached to an upright lever H, by an adjusting pin I, which is capable of sliding in a slot K, made through the lever H;—the upper end of this lever is jointed to a sliding-carriage L, which is sustained and guided in its motions by a pair of horizontal rails M, M. Upon the top surface of the carriage L, a pair of V-grooves N, N, extend transversely, for the purpose of receiving between them two slides or rectangular pieces of metal O, O, which rest on the top surface of the carriage, and move backwards and forwards upon it. To these slides O, O, the toggle-joints or progressive levers P, P, are respectively connected by one end, in a manner which will admit of their moving horizontally. The other end of each of the said progressive levers P, P, is similarly jointed to the tail end of one of two long horizontal levers Q, Q, which are arranged as shewn in figs. 1, and 2, and move or play respectively on the fulcra or pins R, R, which are suitably and strongly connected to a horizontal bed-plate S, fastened to the top rails of the frame. T, T, are the chisel-holders, which consist of curved pieces of metal, made respectively with jaws and other suitable appliances or contrivances for firmly holding two chisels U, U. These chisel-holders are respectively jointed to the forward ends of the two levers Q, Q, by one of two small connecting bars V, V. The said curved chisel-holders are made to move towards and from one another; and for this purpose, as well as for setting them—so that the angle of the plane of each chisel to its adjacent face of the file may be adjusted, or increased, or diminished, as circumstances may require—the chisel-holders should move or play and be guided in their motions between such slides or contrivances as may be connected with or applied to the bed-plate s, in a manner suitable for allowing of their adjustment thereon and adaptation to the cutter-holders, to ensure their proper action. w, is a long horizontal carriage or slide, which rests upon the bed-plate s, and is sustained by it in such a manner as to admit of its moving freely to and fro in a longitudinal direction. This carriage w, has an arch x, applied to it (as shewn in fig. 2,) to stiffen or strengthen it. The object of this carriage is to support the file blank during the operation of cutting the teeth on its two opposite sides. For this purpose it carries two puppets Y, and Z, or suitable contrivances for receiving and holding the file. The puppet Y, has a socket made in it, to receive the shank of the file, which is secured therein by one or more screws *a*, *a*; the other puppet has a small centre-point *b*, projecting from it,—the said point being made to enter an indentation or punch-hole, made in the small end of the file. These puppets should be so applied to their slide or carriage as to be capable of being moved laterally and horizontally, either in one direction or the opposite;—the object of the same being to admit the file to accommodate itself in a proper manner to the cutters, or so that each cutter may operate to an equal depth, when both are forced against the file, so as to compress it between them, and by their pressure raise a tooth or make an indentation on two opposite sides of it. The carriage or slide w, should be moved inwards a short distance, during each interval between any two successive closings of the cutters on the file. For this purpose a screw *c*, is provided, which is supported at its ends by bearings applied to the main-framing A, and bed-piece s, as shewn at *d*, *e*. This screw is placed below the carriage w, and passes through, and works in, a projection *f*, extending down from the carriage,—a female-screw being turned in the hollow of the projection *f*, to fit the thread of the male-screw *c*. The machinery by which the screw *c*, is revolved, or partially revolved, during certain intervals of time, is thus described:—*g*, is a small ratchet-wheel, fixed on one end of the screw *c*, *c*, as shewn best at fig. 5; *h*, is a spur-wheel, mounted loosely on the journal *i^5*, of the screw projected beyond the box *d*; *i*, is a small pawle or click, jointed to one arm of the wheel *h*, and taking into the teeth of the ratchet-wheel; *k*, is a vertical rack-bar, so applied to and sustained by an upright lever *l*, moving on a pin or fulcrum *m^5*, projecting from the main framing, as to be capable of being moved up and down;—the said rack, when thrown against the spur-wheel *h*, engages with it. A connecting-rod *m*, is jointed at its lower end to the lower end of the rack-bar, and at its upper end to one arm of a crank-lever *n*, which vibrates on a fixed fulcrum at *o*. A small pin or stud *p*, projects from the side of the sweep or connecting-rod G, and in such a manner as not only to come in contact with the pendant arm of the crank-lever *n*, when the sweep G, is moved rearwards, but to force the said arm backwards, and so actuate the lever as to elevate the rack-bar *k*, to the extent required to cause the wheel *h*, to rotate; which motion will carry the pawle *i*, against the ratchet-wheel *g*, of the screw *c*, in such a manner as to turn the screw a little, or to the extent required, in its bearings; and thus move the carriage W, and its file a short distance rearwards, or the distance required for the cutters to make another closing upon the file. The extent of motion of the screw (which motion determines what is termed the fineness of the cut or width of the teeth of the file) is regulated by putting a pin *q*, in one of a series of holes *r*, *r*, *r*, made in the lower end of the rack-bar *k*, (see fig. 5,) which rests upon the pin *q*; and as the rack-bar is connected, as before stated, to the crank-lever *n*, the higher the said pin is raised, the more it will draw the pendant arm of the crank-lever *n*, backwards or towards the rear of the machine; so that the stud *p*, of the sweep G, will not strike it so soon as it otherwise would. As the said stud *p*, continues to move through the same distance (the amount of throw of the connecting-rod or sweep G, being determined before the machine is put into operation), the amount of rotation of the screw *c*, will depend on the extent of motion given by the stud *p*, to the crank-lever *n*.

In order to throw the rack-bar *k*, out of gear with the wheel *h*, when it may be necessary to stop the operation of the machine, the lever *l*, is connected to a long horizontal shifting-lever *s*, by a rod *t*, jointed to both. The shifting-lever *s*, turns upon a fulcrum *u*, supported by a bracket from the framing, and is connected with a clutch *v*, which slides over a feather-edge on the driving-shaft B, by means of a rod 1, and vibrating-lever 2, and is intended to take into a clutch-box, attached to the fly-wheel, and connect or disconnect the driving-shaft B, and fly-wheel C, as circumstances may require. The power by which the machine is driven may be applied to a crank, projecting from the fly-wheel, or to a pulley or other equivalent, affixed to it. When the shifting-lever is moved, so as to gear or connect together the fly-wheel and driving-shaft, it is kept in its position by a small lever *w*, (see fig. 4,) having a knob *x*, by which it may be elevated or forced down. The lever *w*, rocks on a fulcrum at *y*; the inner end of it has a bent spring *z*, resting on it, the shape of which will be seen in fig. 3. There is a small projection or stud a^1, applied to the under side of the carriage W, as shewn in fig. 3; the said projection should be made adjustable thereon, and should be so disposed, that at the completion of the last teeth, or the two rows of teeth of the file, it will strike or be moved against the top part of the spring *z*, and force that spring down, so as to trip the lever *w*, or depress its inner end; by which means its outer end will be raised sufficiently to allow the shifting-lever to move laterally. When thus released, a spring b^1, (which is connected by a rod 3, to the lever 2, of the clutch V,) will throw the clutch out of connexion with the fly-wheel, and stop the action of the machine. c^1, is a cog-wheel, fixed on the journal of the screw *c*, and gearing into a spur-gear d^1, fixed on one end of a shaft e^1; which shaft has a small crank-wheel f^1, on its other end, at the front end of the machine. The object of the various parts, just above described, is to enable a workman, by turning the crank-wheel f^1, to readily and quickly rotate the screw *c*, in a direction necessary to create a return movement of the carriage W, to the extent required to commence cutting another file. The next portion of the machinery to be described is that by which the cutters, during any increase or diminution of the thickness of the file, are caused to operate on it by a uniform pressure, so as to cut to a uniform depth.

The operation of cutting the file always commences at its smaller end, or the opposite end to that on which the shank is made; from this end the file usually increases in thickness towards its middle part, from whence to the shank it is generally of about a uniform thickness; but it is necessary that, during the whole of the operation, a uniform pressure of the cutters on the file shall be preserved. It will be understood, that the sliding carriage L, cannot advance so far forward at each closing of the cutters on the file as it did at the preceding closing of them; or, in other words, its range of motion forward is diminished a little at each operation of the cutters: this results from the peculiar manner in which it is connected to the levers, by which the cutter-slides are operated; consequently it will be seen that the obtuse angle of the toggles or progressive levers gradually decreases while the file is being cut towards its middle part. This creates a loss of power applied to the cutters, to cause them to enter the file to the required depth. In order, however, to make up for this loss, the compensatory machinery is employed, which will now be described.

The lower end of the lever H, is connected to a horizontal sliding-bar g^1, (placed at the lower part of the machine) by means of a bent bar h^1, jointed to both the lever and sliding-bar. The bar g^1, is sustained in proper bearings, so as to move backwards and forwards longitudinally. At its front end this bar g^1, is furnished with a series of notches or teeth k^1, into which a projection l^1, from a small lever m^1, (see fig. 4,) catches. This lever m^1, vibrates upon a fulcrum n^1, and is connected to a short lever o^1, (placed above it and adjacent to the disc or circular plate D, of the driving-shaft, as shewn at fig. 4,) by a bar p^1, jointed to both. The lever o^1, rocks on a fulcrum q^1, when it is struck on the top edge of its inner arm by a small cam r^1, which is affixed to the revolving disc D, for that purpose, and comes in contact with the lever at every revolution of the disc. By this means (the outer arm of the lever o^1, being raised, as its other arm is depressed) the lever m^1, is raised sufficiently to remove the projection or catch l^1, out of contact with the notches of the sliding-bar g^1. The object of the notches k^1, and mechanism connected with them, as last specified, is to maintain the position of the bar g^1, as it is gradually forced forward, while the file is being cut from its point or smaller end to its middle part. The sliding-bar g^1, has a cord s^1, fastened on to it, and extending from it to a barrel or pulley t^1, fixed on a horizontal cross-shaft u^1; the outer end of which carries a peculiarly-shaped cam v^1, as shewn at figs. 2, and 5. The periphery of this cam is grooved out, so as to receive a cord w^1, one end of which is fastened to that part of the periphery of the cam which is nearest to the shaft. From the said cam the cord w^1, proceeds to, and is wound around, and attached to, a pulley or drum x^1, mounted on an axle, having its bearings in the framing. Around this drum another cord y^1, is also wound; which cord extends downwards, and is tied to a long lever or bar z^1, which vibrates on a fulcrum at a^2, and has a weight b^2, hung on it, as seen in fig. 2. The front end of the lever z^1, passes through a vertical slot c^2, made in an upright d^2, (see fig. 4). Near the inner side of the lever z^1, a sliding-bar f^2, is placed, and is supported by an arm g^2, (fig. 5,) and the upright d^2, through both of which it is free to move in a longitudinal direction. It has an arm or stud h^2, projecting from a slider i^2, fitted to slide on the bar and be fixed thereon by a set-screw k^2, (see fig. 1). The stud h^2, rests against the iron trammel l^2, of the weight b^2. The sliding-bar f^2, has one end of a horizontal lever m^2, jointed to it, or made to project through a slot cut in a piece of plate-iron n^2, affixed to the bar. The lever m^2, works on a fulcrum o^2, at its opposite end; and at its middle it is jointed or connected to the lower arm of a vertical lever p^2, which turns on a fulcrum q^2, projecting from a longitudinal fixed or stationary bar r^2. At its upper end the lever p^2, is connected to a pawle or lever s^2; one end of which rests in one of a series of notches t^2, made in a plate u^2, which is screwed to the slide or carriage w; and the other end of the pawle or lever s^2, carries a projecting pin, which is made to traverse an irregular slot v^2, w^2, x^2, y^2, formed in a piece of metal z^2, screwed on to the top girt a^3, of the frame. From y^2, to x^2, the slot is horizontal, while from x^2, to w^2, it inclines downwards, and from w^2, to v^2, it is again horizontal. The object of the lever p^2, and its pawle s^2, is to impart (by reason of the inward movement of the carriage W,) a forward motion to the slide-bar f^2, whereby its stud h^2, will be made to press against the trammel l^2, of the weight b^2, and slide it forwards on the lever z^1, and thus increase the power of the weight on the cord y^2; which increase of power is disseminated through the mechanism to the cutters. As the cutting operation progresses towards the middle of the file, it becomes necessary that the weight b^2, should gradually be moved towards the front end of the lever on which it hangs. This is effected by the carriage W, which gradually presses the upper arm of the lever p^2, back, until the pin of the lever s^2, falls into the inclined part w^2, x^2, of the slot v^2, w^2, x^2, y^2. While the pin is passing down the said inclined part, the rear arm of the lever s^2, will be tripped up, so as to raise its front arm out of the notch of the plate u^2. This being effected, the slide W, will continue its inward progress without further acting upon the lever p^2. The tripping of the lever or pawle out of the notch takes place when the cutters have reached the middle or thickest part of the file. Each of the slides O, O, before mentioned, as sliding between the grooves N, N, has an arm b^3, extending rearward from it, and supporting a female screw-bearing or box c^3. A screw-shaft d^3, extends through these screw-boxes, and is provided with two male screws e^3, f^3, one being what is termed a right-threaded and the other a left-threaded screw. A hand-wheel g^3, is fixed on one end of the screw-shaft d^3, while on the other end a ratchet-wheel h^3, is fastened. Into this wheel a pawle, connected with the lever i^3, takes, and is held in contact therewith by a helical spring. The pawle-lever i^3, is arranged as shewn in the drawings, and vibrates, in a vertical direction, on a fulcrum at k^3. To the inner end of this lever a spring-chain l^3, is attached, which extends downwards, and is fastened to a pin m^3, projecting from the rear side of a circular plate n^3, fixed on the shaft u^1, which carries the cam-piece v^1. The object of the two right and left-threaded screws on the screw-shaft d^3, is to enable an attendant to set the edges of the chisels to their proper distance apart when they commence to cut at or near the top or small end of any file. The use of the ratchet-wheel h^3, pawle and lever i^3, chain l^3, and circular plate n^3, is to aid the compensation cam v^1, and its weight, in causing the chisels to act on the file with the force required, as its thickness increases. When the cam v^1, rises up, the front end of the pawle-lever i^3, will be depressed by the chain l^3; and, in consequence thereof, the pawle, at its other end, will be raised against the ratchet-wheel. The return-movement of the carriage L, will cause the said ratchet-wheel to be borne against the pawle, in a manner sufficient to partially rotate the ratchet-wheel, and, consequently, the screw-shaft, in a direction that will cause the screws e^3, f^3, (which act in their bearings) to move the slides O, O, towards one another; whereby, when the carriage L, moves forward to the extent of its motion, the progressive levers may be brought nearer into a line with each other, and, of course, with greater power on the levers intervening between them and the cutter-holders.

The object of the slide-bar g^1, cord s^1, pulley t^1, shaft u^1, cam v^1, cord w^1, and weight b^2, (made to operate directly on the said cord, or through a barrel or drum x^1, a cord y^1, and lever z^1, as hereinbefore described) is to create an additional power, which shall act on the toggles or progressive levers P, P, and make up or compensate for the loss which gradually takes place in the operation of the progressive levers P, P, while cutting the file from the small or rear end towards its middle part, as before described. The cam v^1, should be made of such size and shape as will enable the weight to gradually act with an increasing leverage on the shaft u^1, proportionate to the power lost by the progressive levers. The mechanism by which the trammel of the weight b^2, is moved along the lever on which it hangs, is intended as another help or aid to the compensatory apparatus. The said mechanism may be often used to advantage when the remaining compensation apparatus requires additional power to make it operate as desired.

In the drawings, the cutters are represented as made with straight edges, and are such as would be employed to cut straight teeth, extending across the blank, as in the ordinary file; but when rasps are to be made, the form of these cutters should be varied, so as to make the peculiar teeth required.

Having pointed out the various parts which constitute the improved file-cutting machine, and described their several uses, the patentee gives the following recapitulation of the working of the parts, in order that their combined movements may be fully understood:—A file or rasp-blank, suitably prepared in the usual way, is secured in the puppets Y, Z, of the carriage W; (which carriage is drawn to the front of the machine before the operation of cutting the blank is commenced) and the clutch *v*, is brought into contact with the clutch-box of the fly-wheel C. Rotary motion being thus communicated to the shaft B, the disc D, is caused to revolve, and, through the connecting-rod G, give a vibrating motion to the upright lever H. The upper end of this lever H, being connected with the carriage L, will cause it to slide forward, and operate the pressing apparatus P, Q, and T; by which means the pressure for the cut of the teeth is given to the chisels U. One tooth having been thus made on each side of the file or rasp-blank, it is necessary to move the carriage W, forward a sufficient distance to allow the chisels U, to cut a second tooth, at a suitable distance from the first. This is effected by giving a partial rotation to the screw *c*, which connects the carriage W, with the fixed framing; for this purpose a stud *p*, is attached to the connecting-rod G, and is placed in such a manner as to come in contact (at every throw of the rod G,) with the pendant arm of the lever *n*; which lever, through its connecting-rod *m*, gives an upward motion to the rack *k*, when thus acted on by the stud *p*. While the machine is in operation, the rack *k*, is in gear with the cog-wheel *h*, which is mounted loosely on the shaft of the screw *c*; and being provided with a click or pawle *i*, which takes into the teeth of a ratchet-wheel *g*, fixed on the shaft of the screw *c*, the upward motion of the rack cause the wheel *g*, to partially rotate, and thus gives the required motion to the screw *c*, for producing the gradual inward progress of the carriage W, with the blank.

The patentee here remarks that a repetition of the means employed in modifying the amount of the upward rise of the rack *k*, or the action of the parts for throwing it out of gear with the wheel *h*, will not be required, as they will be fully understood by the foregoing description; he therefore proceeds to shew the connection of the various parts for adjusting the pressure of the chisels or cutters to the increase in the thickness of the blank. The throw of the connecting-rod G, (which is invariable when once set,) being the immediate cause of the forward motion of the carriage L, (which motion produces the closing of the chisels on to the blank) it will be readily understood, that if the relative movements of these parts are absolute, the chisels will meet at a uniform distance apart, and thus, when the blank increases in thickness, produce too deep a cut. To remedy this, the upright lever H, which conveys the motion of the connecting-rod G, to the carriage L, is made to vibrate on a moveable fulcrum or pivot in the bent bar h^1, which is itself supported by the sliding-bar g^1. When therefore a proper forward motion is given to the carriage L, to insure the right action of the cutting or pressing apparatus, the surplus motion of the lever H, is thrown to its other end, and thereby the bar g^1, is slidden forward. This bar is retained in the position it has thus taken by a finger or catch l^1, which drops into a notch in the end of the bar; but this catch being made to rise and fall at every rotation of the disc D, (as was previously explained) the bar g^1, will be allowed to slide back, and permit the lever H, to regain its position. It is, however, necessary to give a certain amount of bite to the chisels, and for this purpose a shifting weight is employed, the progress of which, along the bar z^1, has been fully described. The bar g^1, being connected by a cord s^1, to the pulley t^1, when thrust forwards, causes that pulley to partially rotate, and thus to wind up a portion of a cord w^1, on to the cam v^1, which is fixed on the shaft of the pulley t^1. This cord w^1, is coiled round a pulley x^1, and attached thereto; and from the same pulley a cord y^1, depends, which is attached to the weighted bar z^1. It will therefore be seen, that as the leverage of the weight is increased, so will the resistance to the forward motion of the bar g^1, be increased, and thus the relief given to the lever H, will be regulated; which lever, as before explained, if working on a stationary fulcrum, would always communicate the same amount of forward motion to the carriage L. The increase in the thickness of the blank under operation, at the same time that it presents an obstruction to the uniform closing of the chisels, renders it necessary that the pressing-levers, in connection with their holders, should be adjusted to such increase. This increased thickness being, in fact, the cause of the forward motion of the sliding-bar g^1, the motion which that bar conveys to the axle of the pulley t^1, is employed to draw the inner ends of the pressers P, together, and thus to decrease the proximity of the cutting edges when they close upon the blank. A circular plate m^3, mounted on the shaft u^1, of the pulley t^1, being connected to the pawle-lever i^3, by the chain l, raises the pawle of that lever into contact with the ratchet-wheel h^3, of the screw-shaft d^3; and when the carriage L, on which that shaft is mounted, moves forward, the ratchet-wheel is forced round one tooth by its contact with the pawle; and thus, through the action of the screws e^3, f^3, the sliding-pieces O, O, are made to approach and draw the ends of the pressers P, nearer together, whereby the chisels are adjusted.

The patentee claims, First,—the general arrangement of machinery, as above described and set forth in the drawings, whereby the teeth of a file or rasp may be produced on a blank with great uniformity, and on the opposite sides of a blank at one and the same operation. And he claims, in combination with the apparatus which operates the cutters or chisels, the power-compensating mechanism, whereby, by the action of a weight on a cam or excentric, an additional power is obtained to operate on the chisels, which shall be a compensation or equivalent for the loss of power which takes place in the progressive levers as the file increases in thickness, and while the operation of cutting it from its small end towards its middle part is going on.—[*Inrolled in the Petty Bag Office, January,* 1848.]

To WILLIAM NEWTON, *of the Office for Patents,* 66, *Chancery-lane, in the county of Middlesex, civil engineer, for certain improvements in the manufacture of sugar from the cane,—being a communication.*—[Sealed 18th January, 1848.]

THIS invention consists in drying and pulverizing cane or other substances which contain saccharine matters, and then washing the saccharine matter therefrom; which, when separated from the extraneous substances, may be manufactured into sugar, by evaporation, in any ordinary way.

The cane, or other substance containing saccharine matter, is first cut (by a cane-cutter or other suitable apparatus) into pieces of small size, and then dried in a proper stove or kiln, and afterwards pulverized. The process of drying the cane or other substance containing saccharine matter, after it has been cut up into slices or small pieces, may be conducted in any convenient and suitable manner; but it has been found advisable to place the sliced cane or other substance in a carrying apparatus, consisting of a rectangular metal frame, with a series of shelves placed one above another, and made of wire-work or perforated metal. This apparatus is termed, by the inventor, a carrying panier, and is suspended by chains from a carriage, which is made to run on a railway, so that the panier may, when loaded, be moved in or out of the kiln or stove, or chamber, through which a current of hot air is made constantly to pass. After the cane or other substance has been dried, it is to be pulverized in a suitable mill, and then submitted to the process about to be described.

The apparatus to be employed in this improved process of manufacturing sugar is shewn in Plate VI.; fig. 1, representing a longitudinal elevation of the apparatus; fig. 2, a plan view of the same, as seen from above; and fig. 3, a view of the under side, as it would appear from below. The apparatus consists of a series of any convenient number of tubs or vats *f*, *f*, *f*, placed in a line. Above these tubs there is placed a reservoir of water *a*, from which a pipe *b*, descends, and runs along horizontally the length of the series of tubs; this pipe *b*, is connected with each of the tubs by short branch-pipes *d*, *d*, *d*, furnished with stop-cocks, which, when open, connect the tubs with the pipe *b*, as shewn best in fig. 3; the pipes *d*, are also furnished with stop-cocks *c*, for closing all communication with the tubs *f*, *f*. A small metal box *i*, (see figs. 1, and 2,) is placed on the top of the first tub *f*, and opens into it; from this box *i*, a bent pipe *k*, descends to the bottom of the second tub *f*, as shewn in the plan view, fig. 3, and connects the two tubs together; the second tub is connected with the third in a similar way, as are also all the others, each with the next succeeding,—thus connecting the whole in a continued series. To each of the pipes *k*, there is a stop-cock *l*, whereby either of the tubs may be cut off as required from the series. From the last tub, No. 11, in the drawing, an inclined pipe *n*, leads from the box *i*, at the top of the tub, as shewn in figs. 1, and 2, in place of the bent pipes *k*, *k*, before mentioned; and as there are no other tubs, the pipe *n*, conveys back the liquor to the bottom of the first tub with which it is connected;—this pipe *n*, is furnished with a stop-cock *o*. Another pipe *m*, runs horizontally along the top of the tubs, and communicates with them by short lateral pipes, furnished with stop-cocks *j*, by which either of the tubs can be connected or disconnected to or from the pipe *m*. This pipe *m*, leads by branches *u*, *u*, to the filterers *x*, *x*, when they are used; but if these filterers are dispensed with, the pipe *m*, may lead to the reservoir *z*, direct. Beside the above-described pipes, each of the tubs is furnished with a trap-door or man-hole *p*, at the top (see fig. 2,) with a fastening-piece *q*, and another similar one near the bottom at p^2; through which apertures respectively the pulverized cane or other matter is received and discharged. A railway R, is situated over the tubs, and on it a small car p^1, as shewn in the sectional views, fig. 4, traverses; and from below this car there is a funnel or spout *s*, that serves to direct the pulverized cane into the tubs. Another car t^1, runs on a railway, just below the level of the bottom of the tubs, in a position to receive the contents of the tubs when they are to be emptied through the opening p^2.

The operation of this apparatus is as follows:—the car p^1, on the railway R, above the tubs, is filled with the fresh pulverized sugar-cane or other saccharine matter, and brought over the tub to be filled; and the bottom of the car is drawn out, causing the contents to pass down through the hopper *s*, and through the man-hole *p*, into the tub below. When the tub is filled with the pulverized cane, the door *q*, in the top of the tub is closed. The whole series of tubs being now charged in like manner, water from the reservoir *a*, is let into the first tub, through the pipe *b*, by opening the cocks *c*, and *d*. The water which is thus let into the bottom of this first tub, rises until the tub is filled; it then escapes at top, through the box *i*, into the pipe *k*, which conveys it, partially saturated with saccharine matter, obtained from the cane through which it has passed, to the bottom of the second tub; it then rises and runs through the second tub, in the same way; and, after having passed through several tubs, and acquired the degree of saturation desired (say 20° or 25° of the areometer of Beaumé, 20° being generally reached at the fifth tub), the stop-cock *j*, of this tub is then opened, and the cock *l*, of its pipe *k*, which permits the water, thus saturated with sugar, to pass through the pipe *m*, into one of the two filterers *x*, or into the reservoir *z*, direct. The liquor is then taken to the kettles, or battery, and boiled, in order to evaporate the aqueous parts, as is well understood.

A tube of glass *y*, may be inserted into the box *i*, at the top of each tub, and the areometer can be placed in the said glass tube *y*,—when, by opening a stop-cock, the saturated water will be admitted into this tube; the cock is then stopped, and the degree of saturation ascertained; after which the liquor may be drawn off through a small cock y^1.

When the saccharine matter is all drawn from the cane in the first tub, the areometer will descend to zero, and it is no longer necessary to let the water pass through it; the cocks *d*, and *l*, of the first tub are then closed, above and below, so as to cut off this tub from the series, and the corresponding cocks of the second tub are opened; a new tub being added at the opposite end of the series. After the second tub is exhausted, that is to be in like manner cut off, and so on through the whole series; and, as each tub is exhausted, the water is conducted to another tub. As each tub is exhausted, it is cut off, as before stated, without suspending the operation of saturating the water that continues to pass through the apparatus; and the exhausted cane or other material contained in the tub is removed therefrom by opening the door p^2, and drawing it out into the car t^1, which is on the railway below; the tub is then again filled from the car above with fresh pulverized cane or other material. When the last tub of the series has been operated upon, the stop-cock *o*, (see fig. 3,) is opened, and a communication established, through the pipe *n*, between it and the first tub, which has been filled with fresh cane, and the operation is thus continued.

The patentee claims extracting the sugar from the sugar-cane, or other substance containing saccharine matter, by first drying and pulverizing the cane or other substance, and afterwards passing the water through it, essentially in the manner and for the purpose set forth.—[*Inrolled in the Petty Bag Office, July,* 1848.]

To JAMES LOCHHEAD, *of Milton, Gravesend, in the county of Kent, Gent., for certain improvements in ventilation.*—[Sealed 8th March, 1848.]

THIS invention consists in ventilating buildings, ships, railway and other carriages, and other hollow or enclosed spaces, by means of transparent and semi-transparent or opalescent ventilators, either wholly or partly made of glass, or other similar transparent, semi-transparent, or opalescent vitrified substance, perforated or made with orifices through the substance thereof, in manner hereafter described.

The apparatus employed by the patentee for making pieces of glass with perforations or orifices through the substance thereof, is shewn in Plate V., at figs. 1, 2, 3, and 4; fig. 1, being a plan view of a pan or mould for holding a quantity of melted "metal" or glass, which is intended to be made into a perforated lens; fig. 2, a vertical section of a press, to be used for cutting or perforating the metal or glass intended to form the lens; fig. 3, a plan view of a casting-table and apparatus, similar to that used for casting sheets of plate-glass, but furnished with an extra roller c, for perforating the glass; and fig. 4, a transverse section of this roller c, shewing the shape of the teeth or projections affixed to the roller, and the manner of securing the same by nuts.

The patentee describes two modes of forming plates, sheets, lenses, or other pieces of glass, or other vitrified substance, According to the first mode, the metal, when in a proper state of fluidity, is poured from the pot on to the casting-table (the stream being followed by a pressure-roller, for the purpose of flattening it); and while the glass is in a plastic state a metal mould, with teeth or projections on its under side, is applied to the surface thereof; and this mould, which is fitted to the edges of the casting-table, is forcibly pressed down, and left in that position until the metal has set; after which it may be removed; and the plate, sheet, or pane of glass will be found to have cuts, holes, or openings in it of a corresponding shape to the teeth or projections of the mould.

The second mode of perforating plate-glass (which the patentee prefers) is carried into effect by means of the apparatus shewn at fig. 3, which is a plan view of a casting-table, exhibiting the glass thereon in a fluid state, or while being perforated. A, is the table; B, is the ordinary pressure-roller; C, is the roller, with projections or teeth on it; E, E, are two rods or links, by which the rollers are connected; and D, D, are windlasses, over which are wound the chains F, F, (indicated by dotted lines) whereby the rollers are drawn along the table over the surface G, of the glass. The first roller B, flattens the glass to the required thickness, in the usual manner; the toothed roller C, follows, so supported by wheels that the teeth or projections shall not actually touch the face of the casting-table (and so injure it), but yet perforate the metal, and leave openings therein corresponding to the form of the teeth on the roller C. The time generally occupied in this process, from the pouring out of the metal to the passing off of the rollers, is about one minute and a half. The plate or sheet of glass, after being perforated, is pushed off the table into the kiln, and undergoes the usual processes of annealing and grinding, and likewise polishing, when required. When the teeth on the moulds or rollers do not entirely displace the whole of the melted metal or glass beneath them (as in the case of the casting-table, for the reason above assigned), there will be a slight film of glass left at the bottom of the intended openings, which is removed in the subsequent process of grinding, and leaves perfect openings through the glass.

To form holes or cuts in cast or moulded glasses, intended to be used in ships, prisons, and other places, for the purpose of ventilation, or in glasses or lenses of unusual thickness, the patentee proceeds in the following manner:—After pouring the melted metal into the mould, fig. 1, he forcibly presses the mould, fig. 2, into the melted mass, and leaves it therein until vitrification of the glass has taken place, when he removes it; the glass or lens will thus be formed with openings of corresponding shape to the teeth of the metal mould, fig. 2; and it may then be taken out of the mould, fig. 1, and subjected to one or more of the processes of grinding, &c., before mentioned.

The machine or press, shewn at fig. 2, is so simple, as to require no description, except as to the lower part or mould thereof, H, which is provided, on its under surface, with teeth the shape shewn at fig. 1, in the "pan-mould," which latter teeth project very slightly, so that when the mould H, is pressed down upon the same, the glass is entirely cut through.

With reference to the flat plates, sheets, or panes of glass, before mentioned, it is desirable, in cases where the ventilator is to be placed vertically, that the sides of the openings should incline upwards, as shewn at fig. 6, so as to direct the currents of air upwards, in order to avoid draft, and so as to prevent the entrance of rain-water during wet weather.

Figs. 5, 6, 7, 8, 9, 10, 11, 12, and 13, exhibit several modes of applying plates, sheets, lenses, or other pieces of glass or vitrified substance, made as aforesaid, in the construction of ventilators. Fig. 5, is a front view, and fig. 6, a vertical section of a ventilator, of a rectangular form; it consists of a frame *a*, in which is fixed a pane of glass *b*, having openings *c*, formed therein; this frame also encloses a pane of glass *d*, of the same size as the pane *b*, and with similar openings formed therein; which pane *d*, can be slidden in the frame *a*, so as to bring either its openings, or the unperforated portions of glass between those openings, opposite the openings in the plate *b*, and thus admit the air freely, or shut it off altogether. In order to render the pane *d*, easy of adjustment, the patentee fixes springs *f*, *f*, between the bottom edge of the pane *d*, and the frame *a*; and through the centre of the frame *a*, beneath the edge of the pane *d*, he inserts a thumb-screw *e*, by turning which the position of the pane *d*, can be adjusted. Fig 7, is a front view, and fig. 8, a section of a circular ventilator, consisting of two lenses or discs of glass, with similar perforations formed in each, placed in a frame, in which one is fixed, but the other can be moved by means of the handle, so as to cause its openings to correspond with the openings in the other disc, or not, as may be desired. Fig. 9, is a front view of the top part of a common window-sash, glazed with perforated glass, and covered, when required, by a shutter of glass in a separate frame, suspended from the top frame by hinges, and closing over the perforated panes. Fig. 10, is a front view, and fig. 11, a section, exhibiting the application of a glass ventilator to the door of a railway or other carriage; in this case a pane of perforated glass is fixed in a frame in the usual manner, but immoveable; while a pane of unperforated glass, in a small wooden or metal frame, is so hung that it may be drawn up and let down at pleasure, so as to admit or prevent the air from entering the carriage through the perforated pane;—this ventilator may also be applied to the front windows of carriages in ordinary use. Fig. 12, is a front view, and fig. 13, a vertical section of a common window sash-frame *a*, glazed in the usual manner; on the outside of which sash is fixed a frame *b*, containing three squares of perforated glass *c*:—when ventilation is required, the upper slide of the frame *a*, is drawn down to a suitable extent, so as to permit the air to enter through the perforated panes. In new window-frames for buildings the sash, glazed with perforated glass, might be made to fit the window-frame, so as to move up and down therein, as required.

The patentee claims the mode or modes of making or forming plates, sheets, lenses, or other pieces of glass, or such other vitrified substances, as aforesaid, with cuts, holes, or openings therein, in manner and for the purposes hereinbefore described; and also the mode or modes of applying such plates, sheets, lenses, and other pieces of glass or substances, as aforesaid, in the construction of ventilators, in manner and for the purposes hereinbefore described.—[*Inrolled in the Rolls Chapel Office, May,* 1848.]

To JOHN BARKE GUSTAVUS FERRYMAN, *of Cheltenham, in the county of Gloucester, Gent., for his invention of certain improvements in handles to be applied to various articles for containing liquids or other matters liable to be spilt.*—[Sealed 6th September, 1847.]

THIS invention refers to the attachment or connecting of handles to various articles requiring the same, in such a manner that the article, when held in suspension by the handle, may always be allowed to assume a vertical position without reference to the manner in which the handle itself may be held.

It is well known that handles have heretofore been hinged to pails, cauldrons, and sometimes to candlesticks; but this method of attaching a handle to a vessel involves the necessity of holding the handle in a peculiar position and careful manner, if it is required that the article should always assume a vertical position when in suspension. The peculiarity of this invention consists in attaching handles to various articles by a double-action joint, so that when holding the vessel up by the handle alone it will necessarily assume a vertical position.

In Plate IV., fig. 1, represents, in elevation, a candlestick, with the improvements adapted thereto. The handle is connected to the candlestick by a double-action joint, consisting of a swivel and hinge; the part *a, a,* embraces one half of the candlestick, and is attached thereto by side-pins or studs *b, b*; and the part *a,* is connected to the handle by a swivel-pin; so that by the combined action of the suspending studs *b,* and swivel-pin, the candlestick may always be allowed to assume a vertical position.

Fig. 2, represents the manner of adapting the invention to a saucepan or other similar article. In this case the handle is made removable, so that in fact one handle may be made to answer for several vessels. The saucepan or other vessel is furnished with two projecting pins, hooks, or catches *b**, on to which the arms *a, a,* of the handle are hooked, for the purpose of raising the vessel up; the part *e,* of the handle, being connected by a swivel-joint to the arms *a, a,* in precisely the same manner as in the former instances; but, as it is sometimes necessary to fix the handle temporarily for the purpose of enabling the servant to empty the vessel by tilting it on one side, this object is effected by fixing, at the lower part of the saucepan, a stop or catch *f*, against which a notch, at the lower end of the hand-part of the handle, is brought to bear, as seen in the drawing; and thus the servant is enabled to tilt the vessel and empty it with facility.

The patentee claims attaching or connecting handles to various articles, by means of a double-action swivel-joint; so that such articles, when held in suspension by means of the handle alone, may always maintain a vertical position, and thereby prevent the liability of spilling any liquid or other matters contained therein.—[*Inrolled in the Petty Bag Office, March,* 1848.]

To CHARLES ANDRÉ FELIX ROCHAZ, *of Paris, in the kingdom of France, merchant, for certain improvements in treating zinc ores, and in manufacturing oxide of zinc.*—[Sealed 22nd December, 1847.]

THIS invention consists, firstly, in improvements in the treatment of zinc ores; and, secondly, in improvements in manufacturing oxide of zinc.

First, as regards the treatment of the ores of zinc:—This process has usually been effected by first converting them into the state of oxide, by roasting or calcination, and afterwards reducing and distilling the oxides, by mixing them with coal, and submitting them to great heat, in close vessels or retorts. This mode of operation is attended with great disadvantages, for, besides occasioning great consumption of fuel, and rapid destruction of the retorts, the product obtained is by no means proportionate to the richness of the ore.

By this improved process, the employment of retorts is entirely dispensed with, and the fuel and labor are greatly economized; the operation is also completely independent of the skill of the workman or attendant; and, lastly, the loss of metal incidental to the ordinary method is prevented. Besides these advantages, the patentee observes, that ores of lead and zinc may both be operated upon at once by his improved method.

The principal feature of the invention consists in the reduction of roasted blend-ore (native sulphuret of zinc), and of the carbonates, oxides, or silicates of zinc, and also of the sulphurets and oxides of lead, by the action of the reducing gases of a blast furnace; by which the scoria or slag is fused, the reduced zinc volatilized, and the vapors condensed, and conducted into a receiver of a peculiar form, situated over the mouth of the furnace, and heated by the gases therefrom.

In Plate V., fig. 1, is a vertical section of the furnace, taken in a line with the tuyère holes; fig. 2, is an elevation of the same, on that side where the aperture for charging is situated, the condensers being shewn in section; and fig. 3, is an elevation of the furnace, on the side where the tuyère pipes are situated. *a*, is the aperture or channel for charging; *a**, is a sliding partition; *b*, the outer door or cover for closing the charging channel; *c*, *c*, *c*, are apertures, through which the scoria run; *d*, is an opening between the body of the furnace and the receiver *e*, the lower part of which is formed by the cover or partition *f*, at the top of the furnace; and the upper part by another cover f^1, larger than the lower one, forming a kind of channel, in which the zinc is condensed. *g*, *g*, (fig. 2,) are openings for the escape of the gases; *h*, is an hydraulic main; B, is the tuyère or blast-pipe; and *k*, *k*, are openings for extracting the zinc and any extraneous matters; these openings are luted every time the metal &c., is run off.

The mode of operation is as follows:—The furnace having been heated to the required temperature by the combustion of fuel alone, a charge of zinc ore, either in the state of oxide, carbonate, or silicate, mixed with any suitable flux, according to the nature of the ore, is introduced into the charging aperture *a*, between the sliding-plate *a**, and the door *b*; so that by drawing out the slide *a**, the charge will descend by its own gravity into the body of the furnace, without allowing the gases to escape through the charging aperture *b*. The charge thus falls upon a layer of incandescent fuel, rising to a certain height above the tuyère B. A layer of fuel is then poured upon the ore, then another charge of ore, and so on alternately until the furnace is full; and it is to be replenished in the same manner, when the charge sinks below a certain depth, which can be easily ascertained by experience.

The zinc is volatilized by the heat, and the scoria falls into the lower part of the furnace, and is run out at the apertures *c, c, c*. The volatilized zinc is carried off with the gases arising from combustion, and passes through the opening *d*, into the receiver *e*, above. The gases from the fire-place escape through the openings *g*; and as these latter might carry off particles of zinc with them, they are passed through an hydraulic main *h*, before being allowed to escape into the atmosphere. By this means all solid matters are retained, and the zinc, together with any dust or extraneous particles, is extracted through the openings *k*. When the ore to be operated upon is in a comminuted state, it is advisable to make it up into a paste, together with the flux, by the addition of water, so that it may be charged in pieces of such size as not to pass through the fuel. Zinc ore is often mixed with sulphuret of lead, and by this mode of operation the zinc is obtained by volatilization, and the lead by fusion (this latter running to the bottom of the furnace below the scoria), if, by previous roasting, a portion of the sulphur has been driven off from the ore.

The second part of the invention consists in a novel construction of apparatus for the manufacture of oxide of zinc. Fig. 4, is a vertical section of the furnace and of the chamber, for the reception of the oxide of zinc; fig. 5, is a vertical section, taken in the line *a, b*, of fig. 4; and fig. 6, is a horizontal section of the furnace, taken in the line *c, d*, of fig. 4. A, A, are the retorts or subliming-pots (of which there may be any convenient number), placed in the sole of the furnace; B, B, are the covers of the retorts, which are perforated; C, is the door of the oxidizing-chamber; F, upper flue, through which the gases and other products of combustion pass from the fire-place to the chimney; K, K, are vessels for receiving the zinc, in case of rupture of the retorts or pots, in which case the liquid metal would run down on the floor *a, a*, and from thence into these vessels; L, is the flue or chimney of the furnace; *m, m,* fig. 6, are vertical flues in the wall, for the passage of the waste gases of combustion; N, is a top partition, dividing the oxidizing-chamber E, from the horizontal flue F;—M, M, is a chamber for receiving the oxide of zinc; O, a chimney for creating a draught, and thus drawing the oxide of zinc, together with air and gases, through the chamber M, and alternately over and under the upper and lower partitions P, and Q. There may be any number of these partitions, according to the size of the apparatus, and the quantity of oxide to be manufactured. q^1, is a wire-cloth, or other suitable sifting partition, at the end of the chamber M, for retaining the oxide of zinc, and at the same time allowing the air and gases to pass through to the chimney O. It will be seen that the furnace is divided into three separate chambers or compartments; the lower one, which may properly be called the furnace or heating-flue, contains the retorts A, which are charged with the zinc to be operated upon. The volatilized zinc escapes through the orifices in the covers B, of the retorts, and enters the middle or oxidizing-chamber E. The zinc vapour is oxidized and forced through the chamber M, either by means of a blower or by the draught created by the chimney O, at the end of the chamber M. The upper compartment F, is nothing more than a narrow channel or flue, for the passage of the smoke and gases from the fire-place to the chimney L. These gases heat the dome N, and thus keep the oxidizing-chamber at a sufficiently high temperature to burn the zinc vapours with facility and rapidity. The partitions P, and Q, in the chamber M, are for the purpose of checking the power of the current and facilitating the deposit of the oxide in the chamber M, from whence it is withdrawn by means of openings at the sides.

The patentee, in conclusion, states that he is aware of oxide of zinc having been heretofore obtained by distillation, and bringing the volatilized metal into contact with atmo[illegible]heric oxygen in an oxidizing-chamber; he does not, there[illegible], intend to claim, generally, producing oxide of zinc in [illegible] manner; but he claims, Firstly,—obtaining metallic zinc [illegible] the manner and by means of the apparatus above set forth and described, or any mere modification thereof. And, Secondly,—producing oxide of zinc by distilling the metal or matters containing the metal in subliming-pots or vessels, furnished with perforated covers, through which the volatilized metal may issue into an oxidizing-chamber, where it is met or brought into contact with the oxygen of the atmosphere, and becomes converted into oxide of zinc.—[*Inrolled in the Petty Bag Office, June,* 1848.]

To JOHN HICKMAN, *of Birmingham, in the county of Warwick, clerk, for improvements in the means of constructing and connecting parts of bedsteads, couches, and other articles of furniture to which such improvements may be applicable; and also in the means of attaching knobs or handles to drawers, doors, and other parts of furniture.*—[Sealed 18th January, 1848.]

THIS invention consists, in the first place, of a new or improved mode of connecting the head, foot, and side rails of bedsteads to the pillars, whereby the ends of two rails may be properly secured and held in their places by means of a single screw. One mode of effecting this object consists in letting the screw into the corner-pillar of the bedstead from the inner angle thereof; the ends of the screw being made to bear against and force forward iron or metal tongues, fixed in the end of the head or foot and side rails; and which tongues are let into a socket in the corner-post, and are firmly secured and held in their proper places by the corner-screw before mentioned. This mode of constructing and connecting the parts of bedsteads and couches is shewn in Plate IV., at figs. 1, 2, 3, and 4:—at figs. 5, 6, 7, and 8, two other modes of effecting the same object are represented.

Fig. 1, represents a horizontal section, taken through the rails and corner-post of a bedstead, constructed upon the improved plan; and fig. 2, is a vertical section of the same. In these figures *a*, and *a**, are parts of the head or foot rail and one of the side rails of a bedstead; and *b*, is the corner-post or pillar, to which the rails are secured, in the manner hereafter explained. Figs. 3, and 4, represent plan and side views of the end of one of the rails, each end of which is furnished with a projecting tongue *c*; one end of this tongue being let into a hole made in the end of the rail, and secured therein by a pin or stud *d*, or by an ordinary screw. The projecting part of this tongue *c*, is hollowed out, so as at its extremity to present an internal shoulder, against which the inner end of a screw *e*, at the internal angle of the corner-post or pillar *b*, is made to bear, as shewn at fig. 1. The corner-post or pillar *b*, is furnished with a metal plate *f*, which is secured to its inner angle by ordinary wood screws. Two horizontal holes or recesses *i*, *i*, are made in the sides of the corner-post *b*, for the purpose of receiving the projecting ends of the tongues *c*, of the rails *a*, and *a**. It will now be seen, that, in order to secure the rails to the corner-post, the tongues *c*, *c*, must be inserted into the holes or recesses *i*, *i*, of the post, and then the screw *e*, is to be screwed into the angle of the post, as shewn in the figures,—its inner end being made to bear against the shoulders of both the tongues *c*, *c*, and force them forward until the ends of the rails are jammed hard up against the corner-post, when the three parts will be secured firmly together.

Figs. 5, and 6, represent horizontal and vertical sections of another plan of securing the rails to the corner-post. In this instance the corner-post *b*, is furnished with a projecting pin *c*, which is secured therein by screwing or otherwise; the outer end of this pin *c*, is slotted, and is made to enter a hole or socket *i*, *i*, made in the end of the rail *a*, or *a**. A vertical hole *j*, is made in the rail for the purpose of receiving a wedge-piece *g*, which, when inserted into the slot of the pin *c*, and driven down with force, draws the rail forward and forces it up against the corner-post, which, for the purpose of making the joint more secure, is cut away or countersunk, so as to form a recess to receive the end of the rail, and in some measure assist in supporting the same.

Figs. 7, and 8, represent horizontal and vertical sections of another mode of connecting the rails and corner-post. In this instance a right and left-handed screw *e*, is made to act in female-screws or nuts, set diagonally or angularly in the side rails *a*, and a^*, as shewn at fig. 7,—the ends of the side-rails having a knob or projection formed thereon, which, being made to take into corresponding recesses in the corner-post, will, when the screw *e*, is properly screwed up by the square centre part, draw the rails towards the corner-post, and, by causing the projections thereon to enter the recesses of the post, will secure the several parts firmly together, and support the rails in their proper position.

A further improvement in bedsteads relates to a mode of arranging the iron laths for the sacking of bedsteads, so that they may be simultaneously tightened by the action of a screw or screws. Fig. 9, represents a plan view of a bedstead, with the improvements adapted thereto. *a*, *a*, *a*, are the corner-posts or pillars; *b*, *b*, *b*, the rails; *c*, a centre lath, to which several pairs of laths, similar to those shewn at *d*, *d*, are jointed (only one pair however are shewn in the drawing); and the other ends of these laths *d*, *d*, are jointed to the side rails by studs or buttons, or in any convenient manner. One end of the centre lath *c*, is connected to the head or foot rail by a stud or button; the other end of the lath *c*, is furnished with a shoulder-piece *f*, through which a hole is made, and tapped so as to form a female-screw. The rail *b*, carries a shoulder, and is furnished with a male-screw *e*, which, by taking into the female-screw at the end of the lath *c*, will, when it is screwed up, draw back the lath *c*, and gradually tighten the laths *d*, *d*.

Figs. 10, represent a mode of fastening iron laths of metallic bedsteads to the rails. *b*, is a side-rail of a metallic bedstead, and *d*, *d*, the ends of two iron laths; the side-rail is furnished with staples *g*, *g*, and at the ends of the laths holes *h*, *h*, are made, each being furnished with tongues, which, when the holes are placed over the staples *g*, *g*, enter the same, and prevent the laths from becoming detached from the rails, and hold them in their proper places.

The second part of the invention relates to an improved means of attaching knobs or handles to doors or drawers, and consists in making the shank or spindle of the knob or handle in such a manner, that when introduced into the hole or socket in the drawer or door, intended to receive the same, the shank or spindle may be made to assume a wedge or dove-tail shape; the hole or socket in the door or drawer being suitably made to admit of its so doing. The shank or spindle of the knob or handle may be made either round or square, and should be divided by two cross cuts, made with a fine saw, as shewn at figs. 11, so as to allow the four quarters of the shank to be expanded, when inserted into the hole, and, by filling the same, to hold the knob or handle securely in its place.

On referring to these figures, it will be seen that the hole or socket in the door or drawer is made conical or wedge-shaped; and, when the shank is inserted therein, a wooden or metal peg must be driven from behind into the centre of the shank or spindle, for the purpose of expanding the same, and causing it to fill the hole or socket, in which it will then be securely held.

The patentee claims, Firstly,—the several modes herein shewn and described, or any mere modification thereof, whereby the rails of bedsteads may be secured to the corner-posts or pillars; and also securing laths to the frame of a bedstead, in the manner shewn, as well as the mode of simultaneously tightening the laths of bedsteads, by jointing them to a centre-lath or rod, which may be drawn up in any convenient and suitable manner. Secondly,—he claims the mode, herein shewn and described, of attaching knobs or handles to drawers, doors, and other parts of furniture.—[*Inrolled in the Petty Bag Office, July,* 1848.]

To John Lawson, *of Paisley, North Britain, woollen shawl printer, for an invention of improvements in machinery for separating burs, seeds, and other foreign matters from wool, cotton, and other fibrous substances,—being a communication.*—[Sealed 4th November, 1847.]

In the machines heretofore employed for burring or cleaning wool, cotton, and other fibrous substances, considerable loss and inconvenience have arisen from the peculiar action of the instruments or parts of the apparatus which separate the foreign matters from the fibrous substances, as those instruments are extremely liable to break the fibre, and injure the staple of the fibrous substance. The object of the present invention is as far as possible to obviate this loss and inconvenience; the improvement in the machine being effected by a novel construction and arrangement of parts, and the addition of some other parts, as hereinafter described.

In Plate VI., fig. 1, is a longitudinal vertical section of the improved machine, and fig. 2, is an elevation of the front end thereof. At *a*, *a*, are shewn the ordinary feed-rollers, which, by the aid of an endless apron, carry the wool or cotton to the cleaning or ginning apparatus;—the feeding-apron is not shewn in the drawing, as it does not differ from those in general use. From the feeding-apron the material passes on to the picker-cylinder *b*, *b*.—*c*, *c*, is what is termed the toothed or saw guard-cylinder, and is constructed in the following manner:—The required number of circular saws, of the proper diameter, are placed upon a shaft; and discs of wood or other substance, of about an eighth of an inch in thickness, are interposed between them. By this means a cylinder of saws, somewhat similar to that used in the saw-gin for ginning cotton, is formed,—the saw-plates being, however, much nearer to each other. This cylinder and that marked *d*, which is called the receiver, constitute the most novel features of the improved machine. The teeth of the receiver *d*, are hooked, and they may consist of strong card teeth. The fine comb-cylinder is marked *e*, *e*, and is similar in construction and operation to that in ordinary use. *f*, *f*, is the fan or cleaning-cylinder;—this, with the picker-cylinder *b*, *b*, (with the usual grating beneath the same) are also similar in construction and operation to those employed in other wool-cleaning machines.

In using this machine the cylinders are made to revolve in the direction indicated by the arrows on the drawing. For a machine of ordinary size the picker-cylinder may be about eighteen inches in diameter; the receiver about twelve inches; the fine toothed comb-cylinder about two feet; the toothe[illegible] or saw guard-cylinder about six inches; and the fan abo[illegible] twelve inches. The respective cylinders may be driven b[illegible] bands and pulleys in the ordinary or in any other suitabl[illegible] and convenient manner, and their relative velocities should be nearly as follows:—The fine comb-cylinder *e, e,* may have from three hundred to three hundred and twenty-five revolutions in a minute; the picker-cylinder *b, b,* may perform two revolutions on its axis to one of the fine comb-cylinder; the receiver *d,* may make one revolution on its axis to two of the fine comb-cylinder, and the same may be the case with the toothed or saw guard-cylinder *c, c*; the fan *f, f,* may revolve four times to each revolution of the fine comb-cylinder. Should the relative diameters of any of the cylinders be changed materially from the above, their velocities should be varied in a corresponding degree; for, although it is not necessary that their peripheries should revolve with velocities precisely the same with those above pointed out, the proper action of the machine will in a great degree depend upon the relative speed of the respective operating surfaces.

When the machine is in operation, the wool or cotton is, as above stated, taken from the feed-rollers *a, a,* as heretofore, by the picker-cylinder *b, b*; from this it is taken by the teeth of the cylinder *d,* which the patentee terms the receiver; from these teeth it is delivered on to the fine comb-cylinder *e, e,* upon the teeth of which it is spread much more evenly by the receiver than has been attained under any arrangement of the cleaning or ginning-cylinders heretofore adopted. There may, if preferred, be two or more receivers, properly arranged with the picker and fine comb-cylinders, each of them revolving in the same direction, and performing a like office. An additional receiver, which may be used if required, is shewn by dotted lines at fig. 1. The wool or cotton may, in this case, be spread thinner upon each of these receiving cylinders, and the work be still performed with equal rapidity; with some kinds of wool such increase in the number of receivers will be found particularly advantageous. The teeth of the saw guard-cylinder *c, c,* take the burs, seeds, or other foreign matter from the wool or cotton which is spread upon the fine comb-cylinder *e, e*; and the receiver *d,* is sufficiently near to the said saw guard-cylinder to disengage and clear from it any burs or other refuse matter which might otherwise accumulate upon and choke it. The journals of the shaft of the saw guard-cylinder *e*, *e*, are arranged in moveable boxes or bearings, so that the teeth of the said cylinder may be adjusted or set at different distances from the fine comb-cylinder *e*, *e*, to accommodate the difference in the staple of the several fibrous materials. The action of the fan or cleaning-cylinder *f*, *f*, is the same as in other machines for a like purpose.

The patentee claims combining the toothed or saw guard-cylinder *e*, *e*, with the fine comb-cylinder *e*, of a burring, cleaning, or ginning machine, in the manner and for the purposes above set forth. He does not however claim as new the peculiar mode of constructing such cylinder, but only as constituting, in its combination with other parts, a new and important feature in the above described improved cleaning machine,—as, in the machines heretofore employed for the burring and cleaning of wool, much of the fibre has been broken by the action of the instruments employed in the separation of the foreign matters therefrom; whereas, in the machine above described, this loss and inconvenience is in a great measure obviated, by means of the above combination of the toothed or saw guard-cylinder *e*, *e*, with the fine comb-cylinder *e*. Secondly,—he claims combining one or more cylinders or receivers *d*, with the picker and fine comb-cylinders *b*, and *e*, so as to operate between them, in the manner and for the purpose above mentioned. Thirdly,—he claims the combination of one of the said receivers *d*, with the saw guard-cylinder *e*, for the purpose of cleaning the same.—[*Inrolled in the Petty Bag Office, April, 1848.*]

To WILLIAM PETER PIGGOTT, *of No.* 11, *Wardrobe-place, Doctors' Commons, in the city of London, and* 523, *Oxford-street East, in the county of Middlesex, mathematical instrument maker, for certain improvements in nautical instruments, and in the manufacture of cases for containing instruments, goods, or merchandize.*—[Sealed 8th February, 1848.]

THIS invention consists, firstly, in the application of vulcanized India-rubber, gutta-percha, or a combination of vulcanized India-rubber and gutta-percha, or gutta-percha with other suitable ingredients, to the manufacture of nautical instruments; and, secondly, in the application of the same material or materials to the manufacture of cases for containing instruments, goods, or merchandize.

The nautical instruments, to which the first part of this invention relates, are telescopes and ships' compasses. In Plate V., fig. 1, exhibits an external view of a taper telescope; fig. 2, is a longitudinal section of the tube; and fig. 3, is a transverse section of the object glass of the telescope. *a*, is a tube of brass or other suitable metal, fitted with screws at each end, the same as an ordinary telescope tube; it is covered with vulcanized India-rubber, by first forming a tube of this material, somewhat smaller than the metal tube, and then drawing it over the latter; after which, the India-rubber tube is secured by forcing a brass ferrule or hoop *b*, over at each end. Sometimes the patentee constructs the tubes of wood, and covers them with a solution of gutta-percha, both inside and out, and then with a thin sheet of vulcanized India-rubber. Or the tubes may be constructed of gutta-percha alone, prepared by any of the processes now adopted,—care being taken to have the gutta-percha, or combination of gutta-percha with other materials, from which the tubes are to be made, sufficiently hard, so that it will not spring or bend, as the object is to make the tubes impervious to moisture.

In constructing the object glass (see fig. 3,) the patentee employs rings of vulcanized India-rubber c, c^1; so that by screwing up the cap or brass ring *d*, (provided with a flange *e*,) the edge of the outer face of the lens *f*, will be forced against the ring *c*, of vulcanized India-rubber, and press the latter against the flange *g*; whereby a perfect air and water-tight joint will be obtained, which will render the operation of taking out the object glasses, for the purpose of cleaning, wholly unnecessary. A similar air and water-tight joint is formed with respect to the lens *h*, by the vulcanized India-rubber ring c^1, being forced against the edge of the outer face of that lens, and also against the edge of the cell *m*, by the flange *e*. Vulcanized India-rubber rings may be employed in a similar manner in the construction of the smaller glasses or powers of the telescope. The mode of fixing the object glasses may be slightly varied without departing from this invention;—for instance, the ring *d*, may be dispensed with, by leaving the metal of the cell *m*, sufficiently long to be turned over by means of a burnisher, so as to secure the lens *h*, and ring c^1, of vulcanized India-rubber.

The improvement in ships' compasses consists in forming the compass-box of gutta-percha in the following manner:—A box of gutta-percha, of suitable size and thickness, is first prepared, with a recess turned on the inside of the upper edge, as shewn at *i*, in fig. 4, (which is a transverse section of the upper part of a compass-box); at the bottom of this recess is placed a ring *k*, of vulcanized India-rubber; and upon this ring, within the recess, the glass is placed. The box is then to be chucked in a lathe; and, by means of a suitable tool of iron or other metal, heated sufficiently to melt the gutta-percha, the projecting ledge *l*, can be moulded to the required shape, and brought upon the outer face of the glass, as shewn at fig. 5, so as to render the junction perfectly air and water-tight. Another object to be attained by the use of gutta-percha for the compass-box is, to get rid of unequal local attraction, which frequently occurs with metallic boxes, owing to the difficulty of getting the metal free from particles of iron, technically termed "pins." If preferred, the compass-box may be constructed of wood, and the same covered with gutta-percha; or the box may be covered and lined with a thin sheet of gutta-percha, cemented by gutta-percha in solution, or lined and covered with vulcanized India-rubber.

The improvements in the manufacture of cases for containing instruments, goods, or merchandise, are as follows:—Fig. 6, is a longitudinal vertical section of a case for containing mathematical instruments; the improvement consists in forming a dovetailed groove round the upper edge of the box, or under side of the lid or both, and inserting therein a band or strip of vulcanized India-rubber, of sufficient thickness to project a little above the upper edge of the box, or below the under side of the lid, or both; so that, when the lid is pressed down, an air-tight joint may be formed. The patentee also proposes to construct, in this manner, cases for containing chronometers, sextants, telescopes, and surgical and other instruments; and likewise what are termed "glass cases," for containing instruments, jewellery, and other articles of value, which it is desired to protect from the action of a moist atmosphere. Cases intended for these uses may also be lined with gutta-percha, applied in the form of a solution, or in thin sheets, cemented to the inside of the box by gutta-percha in solution. Cartouch or cartridge-boxes may be made of gutta-percha, with a groove in the upper edge of the box, or in the under side of the lid, or both, to receive a strip of vulcanized India-rubber, for the purpose of rendering the box water-tight. The patentee proposes to line or cover the inside of piano-forte cases with gutta-percha, either by applying it in solution or in thin sheets, cemented to the inside of the case by a solution of gutta-percha: those parts of the case which are removable, such as the lid and front, are to be constructed in the manner shewn at fig. 6.

Packing-cases, for containing goods and merchandise, are to be made of wood, previously prepared by coating one side with a thin sheet of gutta-percha or gutta-percha in solution; or the boards may be prepared by passing them between rollers, with a quantity of gutta-percha in a semi-fluid state, and then manufactured into cases for containing lace, silks, or other goods likely to be damaged by the sea washing over into the holds of ships. Cases for containing articles of value, which it is desirable to protect from the action of sea-air and damp, may also be rendered impervious to air and water, by lining the inside of the case with two or three coats of gutta-percha in solution; or thin sheets of gutta-percha may be cemented on the inside of the case by gutta-percha in solution;—the edge of the case and lid being treated in the same manner before nailing the case up.

The patentee claims the application of vulcanized India-rubber, gutta-percha, or a combination of vulcanized India-rubber and gutta-percha, or gutta-percha combined with other suitable ingredients, to and for the purposes above described and set forth.—[*Inrolled in the Rolls Chapel Office, August,* 1848.]

To Jean Louis Lamenaude, *formerly of Passage Jeoffroy, Paris, now of* 315, *Oxford-street, in the city of Westminster, for a new process of applying or fixing letters of metal upon glass, marble, wood, and other substances.*— [Sealed 18th July, 1848.]

This invention consists in a new method of applying or fixing metal letters upon glass, crystal, marble, stone, porcelain, wood, metal, or other hard and smooth surfaces;—the object being to secure thin metal letters on smooth surfaces without the use of metallic fastenings, such as rivets, bolts, screws, or wire.

The letters may be cut out of thin metal, or made by electro-deposition; and, if preferred, they may be gilded by electro-deposition, or have an enamelled surface produced upon them. These letters are affixed to the surfaces abovementioned by the following compositions or mixtures:—The first composition is made by mixing together 15 parts of copal varnish, 5 parts of fat oil ("say linseed oil litharge, commonly called drying oil"), 3 parts of oil of turpentine, 2 parts of essence of turpentine, 5 parts of animal glue, dissolved in a water-bath, and 10 parts of hydrate of lime. The second composition consists of 15 parts of sandarac and galipot resin varnish, 5 parts of drying oil ("linseed oil litharged"), 5 parts of oil and essence of turpentine mixed, and 5 parts of marine glue; these ingredients are mixed, and then 10 parts of Spanish white and dry white lead are added. The third composition consists of 15 parts of copal varnish and gum-lac mixed, 5 parts of drying linseed oil, 3 parts of a solution of India-rubber or gutta-percha, 7 parts of oil of tar, and 10 parts of Roman cement and plaster of Paris, in powder, mixed. The fourth composition is formed of 15 parts of copal varnish and colophane resin, 5 parts of oil and essence of turpentine, 2 parts of isinglass, in powder, 3 parts of iron filings sifted, or blacksmiths' cinders, and 10 parts of washed earth, or ochre, or rotten-stone.

In concluding his specification, the patentee says, "What I claim, as of my invention, is, Firstly,—the securing or affixing of thin metallic letters on glass, marble, stone, porcelain, wood, metal, crystal, or any other hard and smooth surface, without the use of metallic fastenings. Secondly,—the making of thin letters of metal, and coating of such with an enamel surface of any color; also letters made by the electro-galvanic process, or letters gilded by the electro-galvanic process, and of fixing the same by the compositions herein named. Thirdly,—the compositions, as named in this specification, as applied to affixing letters on the surfaces of the within-named materials. I do not confine myself to the precise proportions or quantities of the compositions, as they vary in accordance with climate or other local causes; but I claim, as new, the various materials in these compositions, with the solvents, in any proportions, as applied to the purposes of affixing letters on the polished surfaces of the material herein named."—[*Inrolled in the Rolls Chapel Office, August,* 1848.]

To HORATIO BLACK, *of the town and county of the town of Nottingham, lace-maker, for improvements in evaporation.*—[Sealed 14th February, 1848.]

THIS invention consists in a mode of supplying water to steam and other boilers, by causing it to pass through a succession of hollow fire-bars, made of wrought-iron, brass, copper, or malleable cast-iron, previous to entering the boiler.

The drawing in Plate VI., represents a plan view of a set of fire-bars, used in carrying out this invention. *a,* is the supply-pipe, through which the water is forced into the tubular fire-bars *b, b*: the water first enters the middle bars b^1, b^1, and, after circulating through the whole series of bars, passes, in a highly heated state, through the pipes *c, c,* into the boiler. It is not essential that the water should be divided into two streams, as the whole supply may enter into one bar, and circulate through the series of bars in the same direction; or more than two divisions of bars may be used in large furnaces. *d,* is a cock on the supply-pipe, to regulate the quantity of water admitted. *e,* is a pipe, furnished with a cock *f,* which is to be opened when the supply of water to the boiler is not going on; as otherwise the heat of the fire would tend to force the water out of the tubular bars; but by the cock *f*, being opened sufficiently to permit the escape of a small quantity of water, such a circulation will be kept up as will prevent the water being driven out of the bars *b*, *b*, when the supply of water to the boiler is stopped.

The above arrangement is suitable either for high-pressure or low-pressure boilers; but, generally, for low-pressure boilers, the patentee attaches a rising-pipe, with a small cistern at the upper part, to the supply-pipe *a*, near the force-pump; and he places a valve over the opening through which the water enters the cistern;—"the valve preventing the water from flowing from the cistern to the boiler, by the valve being weighted, causes a pressure sufficient to force the water into the pipe *a*, and thence through the hollow bars *b*, *b*, into the boiler; the quantity admitted to the boiler being regulated by the cock on the pipe *a*." By means of this arrangement, the water, forced into the pipe *a*, will flow into the boiler so long as it is required; but any excess will pass up the rising-pipe into the cistern, which is provided with an overflow-pipe: the boiler will thus work, at all times, subject to the pressure of the column of water in the rising-pipe and cistern. It should be stated that there is a valve in the pipe *a*, between the rising-pipe and the force-pump; which valve opens towards the boiler, and permits the water to flow in that direction, but closes against any flow of water from the boiler.

The patentee claims, as his invention, the mode of supplying water into steam and other boilers, by causing it to pass through a succession of hollow fire-bars, made of wrought-iron, brass, copper, or malleable cast-iron, and thus greatly improving evaporation.—[*Inrolled in the Inrolment Office, August*, 1848.]

To JAMES BLACKWELL, *of Winsford, in the county of Chester, salt proprietor, for certain improvements in evaporating furnaces.*—[Sealed 2nd February, 1848.]

THIS invention may be applied to all furnaces used for evaporating fluids, or matters in a fluid state, such as water, brine, syrups, oils, &c.; it consists in constructing the furnace with a chamber, for the preparatory coking of the fuel, and with certain air-passages; whereby, the patentee states, a greater degree of heat will be produced, the consumption of fuel lessened, and the production of smoke avoided or diminished.

In Plate VI., fig. 1, is a longitudinal vertical section; and fig. 2, a front view of a furnace, constructed according to this invention, and employed for evaporating brine in the manufacture of salt. The walls *a*, of the furnace, and the fire-bridge *b*, are made of fire-bricks. *c*, is the fire-place, provided with fire-bars *d*; *e*, is the salt-pan, containing the brine to be evaporated; and *f*, is the coking chamber. *g*, *h*, are two sets of air-holes, formed immediately over and under the chamber *f*; which holes lead into the fire-place, and are always left open. *i*, is a passage leading to that part of the fire-place immediately above the fire-bars *d*; it serves to admit air, and through it all such solid residual matters as are left on the bars are raked out from time to time.

A fire is first made in the fire-place *c*, with wood and coal, in the ordinary manner; and then the chamber *f*, is filled to the top, and from end to end, with coal or good coal-slack. The fire in the fire-place *c*, gradually cokes the fuel in the chamber *f*, and draws from it various gaseous vapours, which contribute more or less combustible matter to the fire. When the original supply of fuel to the fire-place *c*, is partly exhausted, a fresh supply of fuel is furnished, by pushing forward the contents of the chamber *f*; and the vacant space thus produced in the chamber is filled with fresh coal or coal-slack. When the second supply is nearly consumed, a third supply is pushed forward in like manner, and so on. "For the first time or two that the contents of the ante-chamber *f*, are ejected upon the fire, they are commonly in an imperfectly coked state, and there is, consequently, a considerable escape of smoke or unconsumed fuel from the chimney, though still much less than usual; but after the fire has been well got up, and the walls of the furnace have become thoroughly heated, the coking keeps so a-head of the consumption of fuel in the fire-place, that there ceases to be any discharge of crude fuel [illegible] the fire, and only a colorless or imperceptible vapor is [illegible]ted from the chimney."

The patentee claims, as his invention, the constructing of evaporating furnaces with an ante-chamber, for the preparatory coking or carbonizing of the fuel, and open air-holes or passages, placed and arranged as above described.—[*Inrolled in the Inrolment Office, August,* 1848.]

To Joseph Barber Haxby, *of Dewsbury, in the county of York, attorney-at-law, for improvements in making communications between the guards, engineers, and other servants in charge of railway-carriages, and also between the passengers and such servants; which improvements are applicable generally where speedy and certain communications are required.*—[Sealed 16th February, 1848.]

This invention consists in making communications between one part of a railway train and another (and for other purposes) by means of apparatus suitably arranged for producing audible signals through the medium of a bell, and other apparatus for giving visible signals.

The bell apparatus (employed for making communications between the guards, engineers, and other servants in charge of railway carriages) may be fixed on the roof or in front of the guard's van, which is placed next the tender, and is constructed on a similar plan to many now in use on various railways; from which van, by being elevated above the rest of the carriages, the guard, whilst sitting with his back to the engine, can command a full view of the roofs of all the carriages, and, consequently, of the signal apparatus placed thereon. The bell apparatus may be placed on the locomotive engine or tender, if preferred; but then a connecting-rod will be required to enable the guard to act on it from his van.

In Plate VI., fig. 1, is an external elevation of the bell apparatus, and fig. 2, exhibits the internal parts,—the case or cover being removed. It consists of a bell *a*, suspended by a bolt *b*, passing through the top, and fastened by a nut that rests on the upper ends of the four uprights *c*, which meet at the top, and are rivetted at the bottom to a sheet-iron plate *d*. The bell is elevated a sufficient distance above the plate *d*, to admit of a moveable hammer *e*, being placed immediately under the outer edge of one side of it. The hammer-stem is mounted on an axis, which is supported by two upright pieces of iron *f*; and the lower end of the stem is connected by a rod *g*, with a crank at each end, to the rod *h*, which slides in staples *i*, *i*, and is of such length that it will extend through the front of the guard's van. By pulling the rod *h*, the hammer will be made to strike the bell; and on the rod being released, the weight of the hammer will cause it to fall and draw back the rod;—the hammer being prevented from falling lower than the position shewn in fig. 2, by the stop *j*. The apparatus is enclosed in a metal case *k*, in the front of which, at the lower part, there is an opening, covered with wire gauze *l*, or perforated zinc, so as to admit a current of air; and at the upper part of the case there is a bent pipe *m*, to collect the sound, and, assisted by the current of air that enters through the wire gauze, to conduct it to the front of the apparatus. The end of the bolt *b*, passes through the top of the case, and receives a nut *n*. The apparatus is fixed upon two brackets *o*, which are bolted to the front of the guard's van. The same construction of apparatus may be used at each end of the train; but the patentee prefers that the guard at the rear of the train should communicate with the guard at the front of the train by visible inaudible signals.

The above apparatus may be used as a station bell, as an alarum bell, and in stable-yards, porters' lodges, &c.; but then a cord or chain is to be attached to the rod *h*, (which is to be shorter than that shewn in the drawings) and, after passing over a pulley, to terminate in a knob or handle; the pipe *m*, is dispensed with, and the top of the case formed without any perforations or openings in it, to prevent snow or other substance from resting on the bell; while the bottom part of the case is left open, or formed of wire, or perforated zinc, or similar material, to let out the sound equally all round.

The passengers are enabled to communicate with the guards and other servants by the following means:—On the top of each carriage, at one end thereof, is fixed the apparatus represented in perspective at fig. 3, and in plan view, with the top removed, at fig. 4. *p*, is a cast-iron box, formed with four legs, which are bolted to the roof of the carriage. *q*, is a hollow pillar, having a large flange q^1, at its lower end, forming a cover for the box *q*, to which it is attached by bolts, passing through the openings *r*, fig. 4. Through the pillar *q*, a wrought-iron rod with squared ends extends; on the top of the rod a bar *s*, is fixed, carrying a vane or plate *t*, at each end,—in one of which plates a recess is formed, to receive the end of an arm projecting from a lamp or lantern (when it is desired to exhibit a light on one side of the plate only), and in the other a large notch *u*, is made, to receive a lamp, when it is desired to exhibit a light in both directions. To the lower squared portion of the rod is fixed a coiled spring *w*, the outer end of which is fastened to a pin w^1; and on the squared part, immediately above the spring, is fixed a lever or handle *x*, by which the rod can be turned partly round, and thus made to wind up the spring. The lever *x*, works in an opening in the box, of such length as to permit it to move the wrought-iron rod through one-fourth of a revolution, and thus to cause the plates *t*, to present their edges only to the view of the guard, instead of their sides; and when the plates are in this position, the lever is kept stationary by means of a catch *y*, shewn detached at fig. 5. The catch *y*, turns on a horizontal pin or axis, and is acted upon by a flat spring *z*; a tail-piece y^1, descends from the catch through an opening in the bottom of the box, and to it a cord is attached, which passes over a pulley and enters through the roof of the carriage into one of the compartments of the same;—several other cords are attached to this cord, and each of these cords, after passing over a pulley, enters into a separate compartment of the carriage.

When a passenger desires to communicate with the guard, he pulls the cord belonging to the compartment of the carriage in which he is sitting, whereby the catch *y*, is depressed, and the lever released; the coiled spring then causes the wrought-iron rod to perform one-fourth of a revolution, so as to present the sides of the plates *t*, to the view of the guard, who, previous to leaving his seat, sounds the bell, to attract the attention of the engine-driver or stoker, in order that one of them may watch his movements; he then proceeds to the carriage where the signal is exhibited, from which, if necessary, he gives signals to the engine-driver or stoker by his lamp or flag; if nothing is required, he draws back the handle, and thus brings the plates *t*, to their former position,—the train proceeding at its usual speed. The patentee says, that this means of communication by signal may be adapted to many other useful purposes in railway management, as well as in other situations where speedy and certain communication is required.—[*Inrolled in the Inrolment Office, August*, 1848.]

To JOSEPH CLINTON ROBERTSON, *of* 166, *Fleet-street, in the city of London, civil engineer, for certain improvements in the manufacture of textile fabrics, stuffs, and tissues, and of certain new products obtained by the aid of such improvements,—being a communication.*—[Sealed 19th January, 1848.]

THE patentee commences his specification by stating that brocaded stuffs, in which the figures or designs are introduced in the process of weaving, possess a decided superiority over surface-printed goods, look better, and bring a higher price; but they are open to this objection, that the mode of manufacturing them admits of but little variety in the figures, and is a great obstacle to freedom of design, besides being difficult and complicated. This invention consists in giving to the patterns or designs of surface-printed goods the same clearness and distinctness, and the same high finish which have hitherto been peculiar to brocades, and in combining, at the same time, with this successful imitation of brocade work, that economy of production and that power of varying the designs at pleasure which belongs to surface-printing alone.

The mode of carrying out this invention is as follows:—The colors used in surface-printing are not, in general, ground sufficiently fine, and, consequently, they neither flow freely and equally, nor penetrate the fibres of the goods thoroughly; on some parts they make but a faint impression, while on others they rest in spotty superficial masses: hence there is a want of clearness and continuity in the lines of the designs, and of fixity in large portions of the colors. To remedy these evils, the inventor grinds the metallic oxides, the lacs, and other materials, from which the colors are derived, to as impalpable a state as possible, by the ordinary grinding-mill; he then carefully mixes the coloring materials with any of the thick fatty oils, in the proportion of two parts of the former to one part of the latter; and the colors so prepared he applies to the engraved surfaces by rollers, in the ordinary way.

To obtain plates which will yield impressions of the required brightness, the following method is adopted:—"A very thin plate of copper *(de deux à trois millimétres d'épaisseur*, or from No. 14, to No. 20, Birmingham sheet-metal gauge) is well cleaned and polished, and the designer draws his pattern upon it; the plate is then re-drawn *(dècalqué)*,—that is to say, the plate is cut through and through in those parts covered by the lines of the designer; and, this done, the plate is attached, by soldering or rivetting, to a foundation-block, in order that it may be printed from. In this way an engraved printing surface, in intaglio, is obtained, in which all the lines are not only made deeper than usual, but are all perfectly perpendicular and square,—that is to say, all at right angles to the surface, and as deep as they are broad; and the printing surface is obtained at an expense much less than such work would cost if produced by other means.

It is stated, that goods printed with such plates, and with colors carefully prepared in the way above described, can only, with difficulty, be distinguished from the best brocades. The colors penetrate the fibres so completely, and the figures are so distinct and clear, that there is no necessity, as usual, for subjecting them to steaming, or to mordants, or to river washing, in order to fix and bring out the colors.

The patentee claims, First,—the improved mode or modes of manufacture, whereby surface-printed goods may be made to rival or resemble brocades in beauty of pattern or design, as above described. Secondly,—the manufacture of imitation brocades, as aforesaid.—[*Inrolled in the Inrolment Office, July,* 1848.]

To Thomas Topham, *of Ripley, Derbyshire, manufacturer, for improvements in the manufacture of railway time-tables.*—[Sealed 25th January, 1848.]

This invention relates to improvements in the time-tables or bills, by which the time of arrival or departure of railway-trains are exhibited.

It has heretofore been usual to have separate time-tables for the trains which run in opposite directions (termed the "up-trains" and the "down-trains"); in these tables the names of the stations have been arranged in succession in a vertical column or line, commencing with the name of the terminus at one end of the line from which a train starts (the names of the intermediate stations succeeding in their proper order), and ending with the terminus at the other end of the line; and in the tables for both the up and down trains, the times of the trains have been read in the same direction—from the top to the bottom of the column. Now, according to this invention, one time-table serves for both the up and down trains, and the times of the trains that travel in opposite directions are read in opposite directions, as in the following example:—

LEICESTER TO MELTON.									Sundays.		Fares.					
Ms.			123 Class	* *	123 Class	* *	123 Class	* *	123 Class	* *	1 Class	2 Class	3 Class	* *	* *	* *
			morn		morn		aft.		morn		s. d.	s. d.	s. d.			
..	..	LONDON	..	12 40	..	4 0	4 0	4 30	..	6 0	..	..	..	..	..	..
..	14½	LEICESTER.	6 0	8 5	7 55	11 15	7 45	9 25	8 45	12 40	..	..	..	3 0	2 0	1 0
4¾	9¾	Syston........	6 20	7 49	8 7	10 55	7 55	9 13	8 57	12 24	1 0	0 9	0 6	2 6	1 6	1 0
8	6½	Rearsby	6 32	7 39	8 17	10 46	8 5	9 3	9 7	12 17	2 0	1 3	0 9	1 6	1 0	0 9
9¼	5¼	Brooksby	6 37	7 35	8 20	10 43	8 9	9 0	9 10	12 13	2 6	1 6	1 0	1 3	0 9	0 6
12½	2	Kirby	6 47	7 25	8 30	10 35	8 18	8 50	9 20	12 5	3 0	2 0	1 0	1 0	0 6	0 3
14½	..	MELTON	7 0	7 20	8 40	10 30	8 30	8 45	9 30	12 0	3 0	2 0	1 3	..	..	..
				morn.		morn.		aft.		aft.				s. d.	s. d.	s. d.
	Ms.			123 Class		123 Class		123 Class		123 Class				1 Class	2 Class	3 Class
* * MELTON TO LEICESTER.									* * Sund.					* * Fares.		

The chief object of this arrangement is to enable a person, who is travelling on a railway to any particular place, to ascertain, at a glance, the time of the next train by which he can return:—thus, supposing a person to start from Leicester by the 7h. 55m. morning train, and arrive at Melton at 8h. 40m., then, on referring to the table, he will find that the next return-train starts at 10h. 30m. In the above table the times of the down-trains run from the top to the bottom of the column, and are to be so read; whilst the times of the up-trains run in the opposite direction: hence, by following a horizontal line opposite any station, the times of the whole of the trains arriving at, and departing from that station, will at once be seen. To assist the eye, the figures of the opposite columns may be of different colors (red and black figures are shewn in the specification, but other colors may be used), or other convenient means of distinguishing the down-lines from the up-lines may be resorted to, such as making the columns of different colors instead of the figures, or by using figures of different forms in the opposite columns.* This distinction, by color, or by shape of the figures, is not, however, absolutely necessary; but it greatly facilitates the use of such time-tables. In most cases the patentee prefers to have the times of the down-trains and of the up-trains in alternate columns or lines; but this is not essential, so long as the times are arranged to be read in opposite directions, and on the same surface; for, in place thereof, the columns containing the times of the several down-trains may succeed each other, and the columns containing the times of the up-trains may succeed each other. Although the patentee prefers that the tables should be arranged with the names of places or stations in a vertical column, and the times arranged in horizontal lines, at right angles thereto, this arrangement may be varied, so long as the times of the trains are arranged to be read in opposite directions.

The patentee claims, as his invention, the new manufacture of railway time-tables, above described.—[*Inrolled in the Inrolment Office, July,* 1848.]

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* In the time-table shewn the columns are distinguished from each other by those for the up-trains having two asterisks (* *) at top and bottom.

Scientific Notices.

ON THE INDUSTRIAL ORGANISATION OF FRANCE.

BEING A REPORT OF THE SOCIETY FOR THE ENCOURAGEMENT OF NATIONAL INDUSTRY.

> "Est quadam prodire tenus, si non datur ultra."
> HORACE.

THE art of governing mankind must ever be esteemed as the highest attainment of mortals; and from this cause, perhaps, it is that so many bold and enterprising characters, untainted with criminal ambition, which would not scruple "to wade through slaughter to a throne," have staked everything to attain the honor of swaying the destinies of nations. This art, as society ceased to be ruled through terror, or in blind submission, has presented more and more difficulties to its acquirement, inasmuch as the dealing out of justice (which is an essential element in securing obedience in the governed) has gradually become most complex, from the springing up of new and conflicting rights. When, for instance, the law was cognisant of but three classes of protected interests, as common to the people,—viz., that of life, landed property, and chattels, there was little difficulty of administering justice to the general satisfaction. New laws were not, therefore, demanded for its nicer adjustment, because what were then in existence were considered ample; yet we never heard, in any age, of the genius of a ruler being *more* than equal to the circumstances of his time. In fact, when countries were more subject than at present to the will of a single governor, their prosperity rose or fell, in exact proportion to the wisdom or folly of the man in supreme command. Now, if, in the growing complexity of interests, consequent on the advance of civilization, the scales of justice have required more nicely adjusting than heretofore, to ascertain with precision the turning of the balance, and preserve its equilibrium, it would follow that men of superior intelligence (at least in the aggregate) are required, to perform the modern duties of rulers. A casual glance at the subjects discussed in our houses of legislature will shew the variety of information which ministers are expected to possess; whereas, those who have really thought upon the matter, and can appreciate the difficulties of treading the intricate mazes which lead to power, must know the impossibility of any man, occupying a high political position, having found even the opportunity to acquire the knowledge which is so frequently called for. The ingenuity and skill frequently displayed in debate, and the extensive surface exhibition of collected information, is certainly to be admired; but to be flippant with information, like a quick counsel, crammed for a pending trial, or a student for an approaching examination, is a poor substitute for that well pondered knowledge, which alone is suited for practical application. Yet it is too often the case, that parliament is deluged with the outpourings of unfledged opinions, which have been newly suggested to, or started by, the orators who utter them, and must be abided by for the sake of consistency. Thus is legislation frequently the result of accident or of impulse; and, in silence, we submit (if the grievance is not immediate)—honoring, in our ignorance, the *wisdom* which guides us, though it be in the direct road to political destruction: for it is too general a creed with the unthinking mass, that office confers wisdom on its possessor. But, it may be replied, in what less erring way, than by the expression of public opinion, are we to select ministers, equal in mental capacity and acquirements to the governing of this great empire? Are we, in this age of science, to sound the human brain by some new arrangement of auscultation apparatus, whereby to ascertain its intellectual strength and vigour of action? We would not wait for the development of such a desirable invention, which may not be readily attainable; but even if we are contented with moderate capacities in our rulers—for superior intellects are rarely to be obtained—there is a certain point to which we can advance in ensuring a government of intelligence; which is, in fact, the only government that can be tolerated, as education becomes more general, and the value of scientific research is more fully appreciated. It is, in our opinion, a duty equal to the greatest intellect, to apply the labors of others to the furtherance of our social advancement, without seeking, by self-labor, to acquire, in the various branches of scientific pursuits, the erudition which is requisite to lay a foundation for a new system of action, or to overturn an old one. This, we are aware, is not the doctrine generally accepted, but we hold, that science and commerce have this analogy,—that without confidence neither will flourish; confidence is, in fact, the great bond in civilized society; and therefore it is that we would have our rulers avail themselves of its benefits when governing mankind. The different qualities of mind requisite for discovering minute facts, and collecting and collating them on the one hand, and for forming therewith a groundwork for future action on the other, should, long ere this, have indicated the desirableness of separating such dissimilar occupation; but ministers must now, if they have not sufficient rash confidence in their own unassisted judgments, rely upon irresponsible informants, while their only proper advisers are left unregarded; or else they will leave difficult questions, such, for instance, as the organisation of labor, altogether untouched. These are statements which cannot be controverted.

Let us now turn to a country where, in the midst of social convulsions, a government without an element of stability was enabled to obtain the deliberate opinions of qualified men, unbiassed by political influence, upon a subject most vital to the prosperity of the people,—and thus to demolish, by the concurrence of public opinion, the most pernicious scheme that ever was devised for the disruption of social organisation. We need not wish to find a better instance of the utility of a public scientific body than that presented by the "Society for the Encouragement of National Industry," which, during convulsions, was itself unchanged, and was able to effect such service as the annihilation of the schemes of that political mountebank Louis Blanc, who well nigh involved his country in irretrievable anarchy. We have here then, from this society's exposition of French industry, a proof of the utility of combining diligent scientific inquiry with political action;—of the advantage to a nation of a society composed of thinking erudite men, on whom the government might rely for wisely directing their councils, and influencing the people to their decisions; and this without the diminution of that utility of a less public character, to which the whole inventive community of France can bear ample witness. Surely it cannot be long before England will prefer the thoughtful deductions from scientific principles to the glib subtlety on which cabinet ministers have now to rely for the reasons which dictate their actions in regulating the commercial condition of the country. If then we gain but the assurance of a national advantage accruing from the connection of scientific bodies with the imperial government, as succours for conveying intellectual sap to the main stem, we shall not have noticed the merits of the "Society for the Encouragement of National Industry" in vain; but, from the general ability of its committees, we doubt not some information towards the organisation of labor in our own country may be gained from the following result of the inquiry that was instituted by order of the French government:—

In 1802, some enlightened citizens, who had the welfare of the people at heart, established the Society for the Encouragement of National Industry. This society has, in all its proceedings, had constantly in view the progress of the useful arts; and it has sought to reward those inventions and improvements which render manual labor more productive, and which allow of that labor being better remunerated. These principles, disseminated throughout all classes of the productive community, have produced favorable results. Owing to the combined efforts of intelligence and labor, most of the products in request for general consumption have increased much more rapidly than the population. The nation, far from being impoverished by increased population, has, individually speaking, advanced in position; and the perceptible increase each year in the prosperity of the people has been the fitting recompense of the promoters of national industry.

The Society has not confined its operations to advancing the interests of masters or foremen, who are the natural and necessary directors of industrial labor, but its efforts have been alike extended to masters, foremen, and artificers.

Whilst proceeding according to these principles, a small number of persons were endeavouring to destroy their unity, upon which alone their success depends. These persons have represented the prosperity of one class as being obtained only at the expense of another. Instead of considering the union of capital and labor as advantageous to both, they have regarded them as antagonistic, and looked upon the different classes employed, even in the production of the same article, as inimical to each other. In other words, they have defined the state of the harmonious combination of industry between masters or patrons, foremen, fellow-workmen, and apprentices, in whatever branch of labor, as *man living on the industry of his fellow man.*

It is not our intention to excuse or palliate any abuse which may oppress the operative classes, for they are the constant objects of our solicitude; and we should hail with joy any legitimate measure which might conduce to their welfare. The question is, however,—are we tending that way? In pointing out ameliorations which may be made by voluntary, prompt, and timely concessions, we must observe, that experience proves that the good understanding between employers and their workmen increases in a ratio proportionate to their mutual prosperity.

We might instance the successful efforts made by great manufacturers (at Fourchambault for instance) in allotting to their workmen land, which they may cultivate when not employed on their regular work. We might also cite other humane and wise measures, having the same object in view; viz., to assist the workman when his business is slack. Lastly, we might instance the arrangements adopted in various localities, for the improvement of the food, lodging, clothing, and health of workmen,—as at Wesserling and Montereau, for example.

The most natural and noble attribute of this Society is to encourage these praiseworthy efforts, and hold them up as an example to others. But we are of opinion, that these methods of improving the condition of laborers, to be successful, must not be compulsory. We think that those concessions, which will necessarily be contested when their effect is to ruin the employers, must not be wrung from them by force.

Reserving for another period the enunciation of the improvements required, we will confine ourselves to a statement of our actual industrial condition; and this we will endeavour to do without exaggerating either the good or the evil. In workshops, as in all other places where men congregate, there will be found the bad as well as the good; but the former are fortunately less numerous than the latter; where, however, the bad predominate, the establishments are gradually broken up by the vices which disgrace them. Every one acquainted with industry, and desirous of discovering the permanent causes of success, will acknowledge that those establishments which prosper most are those in which the workmen are treated *with justice*. The prosperous establishments are the only ones which can properly treat, that is to say, properly remunerate, the services of the workman; and it is at these establishments where the best and most steady workmen offer themselves and remain,—which is another cause of success. The badly-constituted and badly-directed establishments, on the contrary, like those branches of industry which degenerate before they are utterly ruined, are forced gradually to diminish the salary of their workmen, and, at last, can retain only the most inefficient, which is another cause of their ruin. Thus it will be seen, that there exist between the masters and workmen strong and inevitable ties,—that is to say, between good masters and good workmen. In fact, as the master advances his fortune, so the comfort of the workmen increases; and when he is ruined, whatever may be the arrangement of his workshops, that ruin falls upon the workmen, who are compelled to seek employment elsewhere, and, in some cases, another kind of employment, when their branch of industry falls into decay.

The manner in which the numberless situations in the industrial world, commencing with the simple workman, are filled, is not generally understood; we will therefore explain this, that the powerful and beneficial organisation which has been produced in France, by *liberty*, may be appreciated. Under the old monarchy the various professions were divided into distinct, exclusive, and intolerant companies. Any person desiring to become a master could not then do so, whatever might be his capabilities; but since our first revolution in 1789, any workman who is not satisfied with his condition can assume the position of master, without being obliged to go through the old formalities. This it is which now constitutes the *liberty* of industry; and it is not a dead letter. At the present time one million eight hundred thousand citizens, masters of families, carry on manufactures, paying a tax each of them, and employing at least one workman. A much larger number of workmen, masters of families, work in private at their own houses, without paying any duty, and are, consequently, favored, instead of being oppressed, as they were before 1789.

In order to form a correct idea of the situation of the workmen in our various branches of industry, and comprising (agriculture excepted) seventeen millions of men, women, and children, it is necessary, in the first place, to take into account all those who work at home, and who compose much more than half of our workmen. Of the other portion, the great majority have not more than one fellow-workman in each workshop. In a word, in the same manner as France is the country of divided and small landed properties, it is also the country of divided industry and small workshops.

The first and paramount object for the popular interest is to know in what manner these small workshops, which are the creations of workmen, are gradually produced. If the workman possesses only a limited degree of intelligence, or if he is not active, industrious, and steady, it is in vain that he attempts to become a master; he cannot succeed in obtaining custom, or, if he does, he will not be able to retain it; and he is finally compelled to earn, as a subordinate in another establishment, the subsistence which he cannot obtain in his own. When he procures in this manner, under another, the livelihood which he could not obtain by working for himself, we ask all men of good faith whether, since he cannot, with the means at his disposal, work on his own account, it shall be said, invidiously, that he causes himself to be oppressed by another,—and that society ought to take measures to prevent what is called *man living on the industry of his fellow man?* Certainly not. Supposing the workman to be skilful and steady, he can, when he has completed his apprenticeship, either remain with his master and take his chance of rising, or else work at home at piece-work on his own account. All the small workshops, both in town and country, are thus established by simple workmen, who have served their apprenticeship and start for themselves as soon as they are able to raise a little money; and even without that, if they are deserving, as they are very likely in that case to be taken by the hand by some benevolent person.

The number of workmen who determine to stand their chance of independent industry, and who gradually become masters, with workmen in their pay, is so considerable in this country, that most of the superintendents of workshops and factories have commenced by being simple workmen. Another remarkable fact is, that the most colossal fortunes have been amassed by operatives, who have risen from the lowest grade.

Such is the mode of progression, which is not confined to any particular place or period; but is a fruitful and generous movement, continually revivifying national industry. It is a boundless and unfettered assemblage of all available intelligence, experience, and improvement; or, in fact, an accumulation of all progression of persons and things, seconded, in a greater or less degree, by individual energy, order, economy, and all those good qualities which, in workshops, as in the world, contribute to the prosperity of man. In this progressive movement of the industrial population, personal interest, which is, of all counsellors, the one which meets with most attention, induces the master to choose for his foremen and workmen the most skilful, experienced, and steady men he can find. If he studies his interest, he promotes every one, according to his merit, and pays him according to his work; if he has no love for virtue for its own sake, a selfish feeling will make him just in the division and recompense of industry.

We will now endeavour to throw a light upon other results relative to those industrial establishments which, in order to prosper, require large capital, and in which considerable numbers of workmen are employed. From the commencement of the present century, and especially since the general peace, these vast establishments have been developed in France with marvellous rapidity. The manufactures carried on in large manufactories are mostly the produce of new inventions. It was necessary for the manufacturers introducing them to procure new laborers, either from adults, employed in the old manufactures, (who only preferred the new manufactures, inasmuch as they thereby obtained *higher wages,*) or from youth, not hitherto occupied.

It is, therefore, by ameliorating the condition of the operatives, and not by rendering it worse, that they are to be collected and retained; and collective labor, far from entailing misery and suffering upon them, has proved a source of comfort.

With this new and improved condition of the working classes, bestowed upon them by large manufacturers, would it, we ask, be just or reasonable to call this state of things—*man living on the industry of his fellow man?* The Society of Encouragement contradicts this without a moment's hesitation; and every good workman throughout France is of the same opinion. It is therefore proved, that the aggrandizement of manufactures, far from injuring the workman, tends to ameliorate his condition. When a manufactory increases its productive powers, the general expenses are very little altered, whilst the work is capable of being better distributed, according to the abilities of a larger number of workmen; consequently the labor is more productive. Large establishments can therefore sell at lower prices than small ones, and yet pay better wages. What is the result of this? It is, that those countries possessing the largest manufactories can afford to pay the highest wages; and, consequently, that those countries having the smallest are necessarily compelled to pay the lowest. A similar result will strike an attentive observer, on comparing the spinning factories of Alsace and French Flanders. The former are, on an average, nearly double the size of the latter, and average double the number of workmen:—for this reason they are able to pay higher wages for the same quantity of labor, or, which is the same thing, pay the same wages for lighter hours. The only remedy for this inequality is, to encourage, in French Flanders, and other less advanced departments, the aggrandizement of manufactories, in order that they may arrive at the same prosperous state, as regards the operative, as the factories of Alsace.

We have shewn the progress of our most important manufactures during half a century. When first established, they were of moderate extent, with limited capital, and less credit; their profits enabled them first, to pay off the advances which had been made to establish them, and afterwards to increase in size and number. By degrees, the territory of the best situated departments became covered with manufactories, in which the population, attracted by the high wages, found remuneration, occupation, and comfort. If, at the commencement of this century, when the first Consul was giving the utmost encouragement to French manufactures, he had, on the contrary, declared war against productive capital—cut open the fowl that was to lay the golden eggs, and cut down the profits which enabled the manufacturers to enlarge and multiply their establishments—then the magnificent factories which now support hundreds of thousands of our workmen, would either not have been founded, or would have remained stationary and insignificant. During all this time, England, the United States, Germany, and all the manufacturing countries, would have gained considerable advantage over us; they would have shut us out from the market of the world, and taken possession of our trade. Thus speaks experience, and replies triumphantly to unjustifiable projects, having for their object, on the one hand, to attack and break down productive capital; and on the other, to lessen, by force and intimidation, the advantages legitimately obtained by the promoters and benefactors of national industry;—and thus replies experience, in the name of humanity itself, to projects having for progressive result, first, to impoverish, and, finally, to annihilate the most important manufactures naturalized in France, and which, by extraordinary activity, order, patience, and talent, support entire populations.

In time of peace, with the formidable opposition of adjacent countries, and especially England, if the rights of our manufacturers were to be suddenly and forcibly broken down, whilst those of other countries remain intact, we would ask, with what chance of success could they compete with those countries? We should be forced to abandon 800 millions (of francs) of annual products, exported by national industry. This would throw eight hundred thousand workmen (who support double that number of women and children) out of employ, and, consequently, deprive them of the means of subsistence: and this would be the result of a proceeding having for its avowed object the benefit of the operative community; instead of which, the result would be, the equality of poverty and the philanthropy of hunger.*

If we dive into the secret of industrial affairs, what do we generally perceive under the most attractive exterior? Hidden sources of inevitable ruin, which, when suffered to work out, reduce the definitive value of the profits, derived from manufactures, to a most insignificant amount. In fact, the manufacturer, instead of deriving a handsome profit from his business, often finds himself a loser, and bears the loss in silence. The workman continues to be paid, nevertheless, *out of the capital.* The manufacturer, who feels the earth shake beneath his feet, catches like a drowning man at any thing he thinks will save him; he therefore clings to hope, and continues his downward course, in the vain expectation that fortune will take a turn; instead of which, he sinks at length into total ruin. Thus those establishments, which were the envy and admiration of all surrounding ones, are seen, all at once, to fall, even in the midst of peace, when confidence, being at its height, speedily puts prudence to flight. What might not be expected, in times of scarcity and distress,—as inevitable in the industrial horizon as the tempest and the thunder storm, even in our finest summer weather!

From the foregoing, a notion may be formed of the extreme difficulty of ascertaining and estimating, with any degree of certainty, the profits realized by manufacturers. Taken in the aggregate, the profits, running over several years, have sufficed to effect the progress of which we have given an idea. But we are almost fearful of suggesting through what vicissitudes—the effect of international war, or of revolutions and failures—this prosperity has to be attained.

Manufacturers ought to be endowed with superior intelligence, a superhuman foresight, and, so to speak, the gift of divination, to avoid becoming, in their turn, victims of these intermittent crises, whether political or commercial, which ruin commerce, paralyse manufacture, and, by an overwhelming force, break down the most prosperous establishments. Thus the most celebrated and talented manufacturers, such as Richard Lenoir, Ternaux, Pompard de Neuflize, &c., after having considerably and creditably aggrandized their respective manufactures, have ended by losing all. We are, therefore, not afraid to say, that it would be committing a serious error to conclude that, at the present time, French manufacturers are making an excessive profit, or, at any rate, such profit as would justify, or at least excuse, any coercive measure, having for its object to deprive them of the greater part of their profits, in order to suppress their means of enriching themselves, in the same manner as you would suppress a crime, by preventive measures, and call them by the fine name of socialism.

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* The late convulsions in France, it would seem, have been the cause of, at least, one new manufacture being established by French workmen in England,—viz., that of silk nap for hats; the unaided attempts of English [illegible]ufacturers to produce a good quality of this fabric having, we understand, [illegible]lly failed.—Ed. L. J.

The friends of humanity, whose generous illusions we appreciate, and whose errors even we respect, imagine the remuneration of operatives, as effected by free competition in any country, to be too small; they would, in fact, instead of the wages which are obtained by unfettered contract between employer and employed, establish measures and conditions compulsory on the manufacturer.

Without taking into account the powerful reasons above mentioned, *liberty of industry* is, in our estimation, so great a blessing—a condition so necessary to power and progress—that we conceive its rights should control and moderate all theories, conceptions, and projects, even to that most praiseworthy motive, the benefitting of the operative classes.

Manufacturing industry, unlike agriculture, is not rigorously bound to country; alarm and ill treat it, and you will see it desert the nation, which would treat it like a slave. Deprive industry of the complete liberty it obtained in 1791, by the abolition of chartered companies and corporations,—do away with its protective regulations, for the purpose of setting up some communist orthodoxy,—destroy its edict of Nantes, and you will see it, in the nineteenth century, quit, albeit with deep regret, its native shores (as was the case two centuries since) and transport its most valuable branches to England, Switzerland, Prussia, Holland, and even to the United States. These emigrations, ruinous and dishonorable to the country, would demonstrate to the inhabitants of the two worlds the extent to which an excessive power might be stretched or abused; whilst it was, in appearance, and only in appearance, exercised for generous purposes.

Let us digress, for one moment, from the consideration of general and universal principles, to one of the special cases which has for some time engaged public attention. We are so entirely in favor of liberty of industry, that we cannot even sanction the official suppression of those enterprises commonly called *marchandage* (the system of middle men). In this case, the operative complains, not that he is made a profit of by his master, but that he is made a profit of by a fellow workman. We should wish some remedy to be sought after with zeal and sincerity;—we should wish the master to come forward as a contracting party, in order to protect the interests even of the lowest of his workmen. The effect of this would be, that there would no longer be occasion to forbid, by public order especially, intermediate transactions, which are, above all, advantageous to clever, active, and enterprising workmen; it is the first step which tends to raise the position of the operative.

Notwithstanding our predilections, which are strengthened by experience, let us abandon for a moment this grand principle of liberty, which should, above all, be sacred in a republican country.

Let us consult, with a good will, the welfare of the operative classes; let us ask whether it be possible to help the cause by coercive measures, requiring of the manufacturer, under whatever form, superior wages to those produced by the free and equitable agreement which might be entered into between the master and his workman. What is, at the present time, the hidden but certain basis on which the wages, obtained by the operative in large manufactories, is founded? It is the comparative value of the power furnished by the horse, or the steam-engine, or the wind, to compete with manual labor.

Suppose that, on a sudden—this work of animals, or steam, or air, or water, remaining at the same value—the legislature were to raise the price of human labor, either by making a fixed price for a shorter day's labor, or by fixing a higher price for a day's labor of equal duration. The equilibrium of productive forces would, by this means, be instantly destroyed; animal and mechanical labor would thus become cheaper, and human labor more expensive. If the manufacturer, as is ordinarily the case, can only meet competition either at home or abroad, by extreme economy, he will have no resource left but to substitute for expensive human labor the less costly power of animals, or water, wind, steam, or other motive power. Thus the benevolent intention of the supreme authority, intended to ameliorate the condition of the operative classes, would result in the depreciation of human labor, *and deprive the mass of employment,* which is directly contrary to the result desired to be attained.

Shall we go as far as to say, in despair, that we must not only, by coercive measures, increase the price of manual labor, but, at the same time, interdict, by law, any improvement or reduction of cost in mechanical power? The Society of Encouragement would, in that case, become injurious,—its programmes and prizes would be an appeal to public misery, and its highest rewards would become public nuisances.

If, by a mistaken policy, seemingly to the advantage of the workman, such a monstrous system could be put in practice, all progress would be stopped, and we should be rendered stationary; whilst, at the same time, foreign nations would be rapidly progressing, and would deprive us of our share in supplying, not only the foreign market, but also the demand for manufactured produce in the heart of France itself,—even though we were to surround it with a triple wall, like that of China.

[*To be continued.*]

NEW PROCESS FOR ENGRAVING ON SILVER, OR ON SILVERED OR GILDED COPPER.

BY M. POITEVIN.

Some months since we published an ingenious method, discovered by M. Nièpce de Saint Victor, of counter-drawing designs and engravings upon paper, glass, or metal plates. M. Poitevin has succeeded in producing plates, engraved either in relief or in sunk lines, from which proofs may be taken. For the carrying out of this process from two to three hours only are required.

The engraving is first exposed to the vapour of iodine, which becomes deposited upon the black parts only. The iodized engraving is then applied, with slight pressure, to a plate of silver or silvered copper, polished in the same manner as Daguerreotype plates. The black parts of the engraving, which have taken up the iodine, part with it to the silver, which is converted into an iodide at those parts opposite to the black parts of the design. The plate is then put in communication with the negative pole of a small battery, and immersed in a saturated solution of sulphate of copper, connected with the positive pole by means of a rod of platinum. The copper will only be deposited on the non-iodized parts corresponding to the white parts of the engraving, of which a perfect representation will thus be obtained;—the copper representing the white parts, and the iodized silver the black parts. The plate must be allowed to remain in the bath for a very short time only; for, if left too long, the whole plate would become covered with copper. The plate, after having received the deposit of copper, must be carefully washed, and afterwards immersed in a solution of hyposulphite of soda, to dissolve the iodide of silver, which represents the black parts; it is then well washed in distilled water, and dried. The next operation is, to heat the plate to a temperature sufficient to oxidize the surface of the copper, which successively assumes different tints, the heating being stopped when a dark brown color is obtained. It is then allowed to cool, and the exposed silver is amalgamated,—the plate being slightly heated, to facilitate the operation. As the mercury will not combine with the oxide of copper, a design is produced, of which the amalgamated parts represent the black, and the parts of the plate covered with oxide of copper represent the white parts. The amalgamation being completed, the plate is to be covered with three or four thicknesses of gold leaf; and the mercury is evaporated by heat, the gold only adhering to the black parts. The superfluous gold must then be cleaned off with the scratch-brush; after which, the oxide of copper is dissolved by a solution of nitrate of silver, and the silver and copper underneath are attacked with dilute nitric acid. Those parts of the design which are protected by the gold, not being attacked, correspond to the black parts of the plate; the other parts corresponding to the white parts of the engraving, may be sunk to any required depth. When this operation is completed, the plate is finished, and may be printed from in the ordinary method of printing from wood-cuts.

To obtain from the same prints plates with sunk lines, similar to the ordinary engraved copper plates, a plate of copper, covered with gold, is operated upon. On immersion in the sulphate of copper solution, the parts corresponding to the white parts will become covered with copper. The iodine, or compound of iodine formed, is then to be removed by the hyposulphite, the layer of deposited copper is oxidized, and the gold amalgamated, which may be removed by means of nitric acid,—the oxide of copper being dissolved at the same time. In this instance, the original surface of the plate corresponds to the white parts of the print, and the sunk or engraved parts to the black parts, as in the ordinary copper-plate engravings.—[*Bulletin de la Société d'Encouragement.*]

Scientific Adjudication.

VICE-CHANCELLOR'S COURT,

Before Sir J. K. BRUCE,—August 14th, 1848.

M'CREA *v.* HOLDSWORTH.

MR. WIGRAM, on the 10th inst., moved for an injuction in this case, and obtained an interim order, extending up to the 14th. On that day Mr. J. V. Prior again moved for the injunction. The facts of the case, under dispute, were as follows:—The plaintiffs, Messrs. M'Crea and Shepard, stuff merchants, &c., at Halifax and Bradford, invented, in May, 1847, a design of a pattern for ornamenting woven fabrics, and duly registered the same under the statutes 5th and 6th Victoria, and 6th and 7th Victoria. The registration was dated September 18th, 1847, and protected the pattern for twelve months. The design was so popular that thirty power-looms were kept by the plaintiffs in full work to produce damasks ornamented with the same; and the defendants, Messrs. Holdsworths, of Halifax, without license from the plaintiffs, manufactured fabrics with the plaintiffs' design thereon. The bill, amongst other things, prayed for an injunction to restrain Holdsworth and Co. from selling or disposing of any of the articles manufactured by them, to which the plaintiffs' design, or any fraudulent imitation of the same, had been applied, and from applying the same design to any woven fabrics or articles of manufacture. So far as this part of the prayer the interim order was granted; but the bill also prayed, and now the motion extended to it, "that Messrs. Holdsworth and Company should deliver up to the plaintiffs, to be destroyed, all articles manufactured by them with the plaintiffs' design thereon, and all point paper patterns and stamped or perforated cards, and other articles in their power, for the purpose of applying the pattern to articles manufactured by them."

Mr. J. V. Prior now supported the motion, and cited the 3rd section of the act as conclusive.

Mr. Cole, for the defendants, said, that the defendants were at first ignorant of the design being the plaintiffs', but that as they were now aware of it, they did not intend to sell until the expiration of the period for which the registration certificate was granted. By the terms of the Act, the copyright exists for only one year. When the defendants discovered that the design was registered, they abstained from any attempt to sell, and, in point of fact, no one single piece of goods had been finished for sale. The question for the Court to decide was on the construction of the 7th section, which, for preventing the piracy of registered designs, enacts, " That during the existence of any such right to the entire or partial use of any such design, no person shall either do or cause to be done any of the following acts with regard to any articles of manufacture or substance in respect of which the copyright of such design shall be in force, without the license or consent in writing of the registered proprietor thereof; that is to say, no person shall apply any such design, or any fraudulent imitation thereof, for the purpose of sale, to the ornamenting of any article of manufacture, or any substance artificial or natural, or partly artificial and partly natural." By the terms of the injunction asked by the bill, the words " for the purpose of sale" are omitted, and the plaintiffs are limited by the 7th section to protection so guarded. The defendants have not sold nor offered for sale, and do not intend to offer for sale, so long as the plaintiffs' pattern is protected by the Act. The two things restricted, and the only two things restricted, by the Act, are the "sale" and " application of the pattern for the purposes of sale."

Mr. J. V. Prior, in reply, said, that as to sale, the Act only inflicts penalties after notice. The 3rd section was that which did in reality apply. By that section the legislature gave the sole right to the proprietor of any design to apply it to articles of manufacture, provided the same was done within England, Scotland, or Ireland, " whether such design is applicable for the pattern, or for the shape or configuration, or for the ornament thereof, or for any two or more of such purposes, and by whatever means such design may be so applicable, whether by printing, or by painting, or by embroidery, or by weaving, &c., or by any other means whatever, manual, mechanical, or chemical, separate or combined." The object avowed by the defendants is, to throw the pattern into the market the moment the plaintiffs' protection expires on the 19th September, and that is contrary to the Act.

His HONOUR.—This case is within the 3rd section. The proprietor of every such design is secured by the Act in the sole right within Great Britain and Ireland.

Mr. Cole.—If that be your Honour's view of the Act, the matter had better be proceeded with no further. I offer to pay the costs up to this time, and all paper patterns and stamped cards shall be destroyed.

An order was then made, by consent, that all goods made by the defendants with the plaintiffs' pattern, and all paper patterns, stamped cards, and other things used in making the manufactures with the plaintiffs' pattern, should be delivered up; that the defendant should pay all the costs to the present time; that the suit should be stopped; that the injunction should be stopped; and all further proceedings should be stayed, except in case of a breach of the injunction.

COURT OF EXCHEQUER.

August 21st, 22nd, and 23rd, 1848.

Home Circuit, Guildford.—Before the Lord Chief Baron Pollock and a Special Jury.

HAMILTON *v.* COCHRAN.

THIS was an action brought for an alleged infringement, by the defendant, of a patent of which the plaintiff is assignee. The cause commenced on Monday morning, August 21st, and occupied the Court till the middle of the day on Wednesday.

Mr. Serjeant Channell, Mr. Serjeant Shee, and Mr. Peacock, appeared for the plaintiff; Mr. Chambers, Q.C., Mr. Willes, and Mr. Hindmarch, for the defendant.

Mr. Serjeant Channell, in stating the case, said the plaintiff was a native of the United States, residing near New York; and the defendant was also a native of that country. The plaintiff had devoted his attention for many years to the improvement of the mode by which timber for ship-building purposes could be at once cut to the required shape for use; and he at last succeeded in inventing a sawing machine, by which timber could be cut to any shape in less time and with much less waste of stuff than by the common process of first sawing into straight parallel pieces. In the United States he obtained a patent for this improved machine; and being also desirous of obtaining patents in Europe for the same invention, the necessary drawings and specifications were forwarded to Mr. Junius Smith, a gentleman residing in London, who obtained a patent in his own name, and afterwards assigned it to the plaintiff,—the specification of the invention having been duly inrolled. A short time before the English patent was sealed, Mr. Hamilton, jun., son of the plaintiff, arrived in Europe, for the purpose of making some necessary arrangements for working the invention. Mr. Hamilton, jun. subsequently took with him to France the specification that was originally sent from America; and a patent was taken out in France on behalf of the plaintiff, in the name of Mr. Livering, a resident in Paris. The plaintiff himself soon after came to Europe, and as, according to the French law, it was necessary to put the invention in practice within a given time, the plaintiff went first to Paris, where he superintended the construction of a machine at the works of Messrs. Middleton and Varrell; and, as the invention was found to succeed, another machine was constructed at Toulon, and put into operation, under government inspection, at Marseilles. While the machines were being constructed at Toulon and Paris, respectively, the defendant had opportunities of informing himself of the plaintiff's invention; and, upon one occasion, he appeared desirous of becoming personally interested in it; but no arrangement of that description took place, although negotiations were entered into. Shortly after this, the defendant applied for and obtained a patent in England for a machine for cutting timber. The learned serjeant went on to say, that, in October, 1846, the defendant represented himself as the inventor of a new sawing machine; and the subject being brought under the consideration of the Admiralty, Mr. Cochran received instructions to erect one of his machines in Woolwich dockyard; and this was accordingly done. This machine the plaintiff considered was, with some trifling exceptions and unimportant additions, constructed upon precisely the same principle as the one for which his patent was granted; he therefore considered his rights had been infringed upon by the defendant. The learned serjeant said, there would be two important questions for the jury to decide; first, whether there was any novelty and utility in the invention of the plaintiff,—whether, in fact, something was obtained which had not been accomplished before; and, secondly, if they thought this to be the case, whether the defendant had appropriated in his own machine any material portion of the plaintiff's invention. With reference to the first question, he should shew, that the sawing machine of the plaintiff had accomplished something which had not been done before, namely, cutting wood by one saw, in curves and bevils, and also compound bevils; and the most important feature in the machine was, that the saw, instead of being fixed in one saw-frame or gate, was mounted on pivots or centres in an inner frame, which, being itself mounted on slides or sockets in an outer saw-gate or frame, admitted of the saw and frame being made to move in a lateral direction. The log of timber to be cut or sawn was also mounted in a peculiar manner on revolving chucks or dogs; so that, while the saw was operating, the log being made at the same time to rotate gradually, a winding bevil, or a compound bevil, of any required angle or angles, could be produced with accuracy. The case, therefore, on the part of the plaintiff was, that this machine, so erected at Woolwich, and for which the defendant had already received a large sum of money, was, with some trifling exceptions, precisely similar, in its most important and essential features, to the one for which the plaintiff had obtained a patent; and, therefore, if he established that fact to the satisfaction of the jury, he should be entitled to their verdict.

The specifications and the letters patent, as well as an assign-ment of the letters patent from Smith to the plaintiff; and also a model of the machine, invented by the plaintiff, were then put in.

In answer to the plaintiff's declaration, the defendant pleaded, that Junius Smith was not the true and first inventor; that he was not in possession of the invention when he obtained the patent; that the invention was not new or useful; that it would not perform what it was stated in the specification it was intended to do; that the specification was not sufficient, and did not accurately describe the invention; that the defendant's machine was superior in every respect to the plaintiff's alleged invention; and, lastly, that the defendant's machine was not an infringement on, or imitation of, the plaintiff's.

On behalf of the plaintiff, Mr. J. Smith deposed, that he acted as the agent of Mr. Hamilton to obtain the patent in England; his correspondence with the plaintiff, in reference to this matter, began in 1841. In June, 1842, he received from plaintiff a letter, containing the specification and rough sketch of the machine; and, in consequence of instructions accompanying the specification, took steps to obtain a patent in England. In April, 1843, Mr. Hamilton, jun., came to England, and received from witness the specification for the patent.

Mr. Samuel Haven Hamilton stated that he was the son of the plaintiff; that he came to England in April, 1843, about the patent; that he obtained from last witness the specification, and handed it to Messrs. Newton and Son, with instructions to complete the patent, and prepare the specification for signature; that he received the specification again, and took it with him to Paris, where he gave it to Mr. Livering to obtain a French patent.

Mr. William Edward Newton, of the firm of Newton & Son, civil engineers and patent agents, proved receiving instructions from the last witness, some time in May, 1843, to complete Junius Smith's patent; also received from him the American specification, and instructions to prepare the specification for English patent, which was accordingly done;—the patent being sealed on June 3rd, 1843, and the specification signed by Smith on July 5th of the same year.

On behalf of the plaintiff various scientific witnesses were called, to prove the usefulness and novelty of the invention, and the sufficiency of the specification. The principal of these were Mr. Carpmael, civil engineer; Mr. Cowper, professor of machinery at King's College; Mr. Cottam, engineer; and Mr. W. E. Newton, civil engineer and patent agent. The testimony of these gentlemen went to prove that the drawings and specifications of the plaintiff's machine were so plain and intelligible that a machine could be readily constructed from them. They had seen the machine at work at Stepney. The object of it was to cut wood for ship-building to any required shape, thereby obviating the tedious process of first using the hand-saw, and then shaping with an adze. The principles of the invention were twofold:—first, the application of an inner saw-frame or gate, capable of moving within the ordinary saw-gate of a saw-mill; the saw being stretched in the inner frame on an axis, so as to admit of varying the direction of the cutting by means of a split-bar or lever, used for directing the saw. Another principle was, that the timber required to be cut had an axial motion given to it, when necessary, so as to produce any required bevil with the saw. The witnesses described some other particulars, and stated, that, from their knowledge of engines and mechanics, they had no doubt that the combination of the principles referred to were an entirely new invention when the plaintiff obtained his patent in 1843.—In cross examination, it appeared that all these witnesses had seen the defendant's machine, at Woolwich, and that, in their opinion, the defendant's machine was precisely similar in principle to the plaintiff's. Defendant's machine had two saw-frames in an outer gate,—both saws being moveable on their axis. There was some difference in detail between the defendant's and plaintiff's machines; for instance, the defendant does away with one side of the inner saw-frame; this, however, gives rise to a difficulty, which is, that it causes the inner saw-frame to bind, and prevents it from running freely on the outer frame or gate. The defendant's saws were mounted outside the inner saw-frames, and they were worked on their pivots by a parallel motion instead of direct, by means of a forked lever or split. In defendant's machine there was also a roller under the log, for the purpose of supporting it. In plaintiff's machine there was no roller, as it was not considered necessary. The witnesses all saw logs cut in plaintiff's machine, and, although the logs were very crooked ones, there did not appear to be any necessity for a support; if, however, one should, in extreme cases, be required, the specification provides a plan of supporting the log, by means of a weighted lever. The witnesses were examined at some length, as to their knowledge of a previous patent granted to the plaintiff, Mr. Hamilton, in 1833, for a machine for sawing ships' timbers with plain or compound bevils; and they were unanimously of opinion, that although the machine specified under that patent might possibly be made to work, yet that it would be an operation requiring such skill and attention on behalf of the workman, and was so extremely difficult to manage, as to be nearly useless for commercial purposes. A model of this machine was in court, and its construction was explained by one of the witnesses; and it was shewn, that the mode of turning the log, to produce the bevil, was different in principle in both the machines patented by the plaintiff,—viz., the patents of 1833 and 1843; and that the defendant's plan, although somewhat different in detail, was substantially the same in principle as that described by the plaintiff in his specification of 1843.

Mr. Ward, M.P., the secretary to the Admiralty, proved that an order had been given to the defendant for the construction of the machine at Woolwich, and it was set up in February, 1848. This machine, as well as another of a different construction, had been paid for, but the machine had not yet been sufficiently tested to enable them to decide upon its value. The amount paid for the two machines was £2,400.

Mr. Green, a mechanic, who had worked the plaintiff's machine for some time, proved that it was a useful and efficient machine, and worked with great ease: he had seen the defendant's machine at Woolwich, when the saw had become so heated, by cutting a log, that he seriously burnt his fingers by touching it, after the sawing operation had been completed.

Mr. Middleton, of the firm of Middleton, Varrell, and Elwell, engineers and machine-makers, of Paris, proved that the plaintiff had built one of his improved sawing machines at his establishment, in Paris; that the defendant was there also, superintending the construction of a pile-driving machine; and that defendant had ample opportunities of seeing plaintiff's machine, while being constructed. Letters were put in, written by the defendant to this witness, from Toulon, after he had seen plaintiff's machine at work there, stating that he was much pleased with it, and that it had "astonished the natives;" that he knew nothing of ship-building, or of the machine, until he had seen it at work; that it performed admirably, and only wanted a few alterations, *in capacity only*, to make it equal to do any work that might be required.

Some other witnesses were examined, to shew the utility of the plaintiff's invention; and the model of his machine having been shewn to the jury, and the various portions of it described to them, this concluded the case for the plaintiff.

Mr. Chambers addressed the jury at considerable length, on behalf of the defendant, and went into an elaborate detail of the invention,—a beautiful working model of the defendant's machine having been produced in court for that purpose. The learned counsel, after having explained, with the assistance of the model, the construction and operation of the defendant's machine, and pointed out those parts which were considered to render it superior to the plaintiff's invention, said, he should be able to shew, by the witnesses he intended to examine, not only that the defendant's machine was no infringement upon the plaintiff's patent, and that it was substantially different in all its principal features, but that the plaintiff's machine was extremely defective and incomplete, and, in fact, could not be rendered of any utility, commercially speaking, without the addition of the various contrivances introduced by the defendant in his machine; he should also shew, that the plaintiff's invention was not new, and that all its principal features were known before the date of his patent, and were, in fact, borrowed from prior patentees. The rotation of the log on its axis, a point on which the plaintiff laid so much stress, was, in fact, described and claimed by him in a prior patent, granted in 1833, and had, therefore, now become public property. The plaintiff could not, therefore, now come and set up a claim for that, but must confine himself to his particular mode of mounting the log on dogs, with pins or studs on their face, and causing it to rotate on its axis by means of a lever connected to a guide-bar. The learned counsel said, he should shew that the defendant mounted and worked his log in a very different and much more efficient manner. The defendant firmly held the log by each end, in a pair of clamps, as in a vice; these clamps being made moveable sideways, so that when a very curved or crooked log was to be cut, the log might be equally balanced, and the machine thereby prevented from being strained. The defendant had also, in his machine, a means of supporting the log while being cut, by employing what he termed an oscillating rolling rest: he should shew that this was a most necessary and beautiful contrivance, the absence of which from the plaintiff's machine rendered it comparatively useless for cutting very crooked logs. The next point upon which the plaintiff laid great stress was, mounting the saw in an inner saw-frame, and giving it a lateral motion within the outer gate. Now, he should shew that the defendant did not mount his saw in a frame; but that it was, in fact, only the bow-saw mounted in the ordinary saw-gate. It was necessary, he apprehended, for a frame to have top, bottom, and sides; whereas, the defendant's saw was attached at top and bottom to two levers, whose fulcra were placed in a long vertical bar,—their opposite ends being connected together by an adjustable tie-rod, whereby the saws might be stretched to the required tension. The defendant had also a very beautiful contrivance for guiding the saw, by means of a parallel motion, which was connected to the saw both at top and bottom. This was essentially different from the manner in which the plaintiff guided his saw; and it would be shewn by the witnesses to be a much better plan. With respect to the lateral motion of the saw, so as to cut curves, he should be able to shew the jury that that was not a new invention, as the same thing had been done many years ago, and, in fact, formed the subject of a patent granted to Messrs. Gibbs and Gatley. He should call Mr. Gibbs before them; and he would tell them, that his machine, in which this principle was embodied, was employed for cutting wood in curved lines; and, although he did not certainly allude to cutting ship-timbers, as that was not the object he at first had in view, yet there could be no doubt that a machine upon the same plan might be made to cut timber of any size. The learned counsel concluded a long and eloquent address, by stating, that he should be able to prove that the defendant's was a most valuable and useful invention, and had been highly approved of by the authorities in the dockyard; that it was substantially different from the plaintiff's machine, and was much superior to it in operation, inasmuch as it would cut two sides of a piece of timber at one time; and that the bevils on the log might be altered, when required, without stopping the action of the saw,—an operation which could not be effected with the plaintiff's machine; and which therefore, he submitted, must be altogether different in construction. The learned counsel then proceeded to call a great number of witnesses to speak to the utility and advantage of the defendant's machine, its superiority over the plaintiff's invention, and to prove that the two inventions were substantially different in principle.

The first witness called was Mr. Jordan, the inventor of the patent carving machine, who stated, that he was well acquainted with the defendant's machine, and had seen and examined a model of it, but had not seen a model of the plaintiff's machine until yesterday.—He had not seen the plaintiff's machine in a working state, but had examined Junius Smith's specification;—the mode of mounting the timber, therein described, was similar to that of mounting a log in the common lathe; the plaintiff had two modes of turning the log,—one is rather complicated, and consists in mounting the log on rotary dogs, one of which is connected to an apparatus, consisting of a gauge-bar and an index-bar, whereby the log is turned. The witness exhibited a model of this apparatus, made, as he stated, from the plaintiff's specification. The other mode of turning the log was, by making an index-bar run along a guide-bar, as in the working model exhibited by the plaintiff. The witness said, there was no mode described in the plaintiff's specification of holding the log steadily between the two chucks, or of supporting the log while being cut. A weighted lever is mentioned, but the witness did not think it a good mode, as the lever would have a tendency to turn the log in the chucks,—the supporting lever has its fulcrum on the travelling bed. The plaintiff has nothing but points or pins on his chucks, but he mentions that he sometimes uses clamps or frames. The mode of sliding the dogs laterally does not affect the balance of the log. Large pieces of oak are very heavy, and when crooked, unless they are supported, they will strain the dogs. In ordinary saw-mills, the logs are supported by rollers: the plan described by plaintiff, of supporting the log by means of a weighted lever, is not a good one, as it would tend to increase the vibration. There are many differences, of great importance, between the plaintiff's and defendant's machines:—1st, instead of pins, or dogs, or chucks, the defendant uses clamps to hold the log;—a model of the clamp, used by the defendant, was produced and explained by the witness. It appeared that the upper jaw was made moveable, so as to admit various sizes of timber; it is also made to turn sideways; the lower jaw is placed on a level with the axis, about which the log turns; the log is not placed entirely above the line of the axis of the chuck, but the great mass of the log is above the axis. The witness explained that, by axis, he meant an imaginary line drawn through the centre of the axletree. There is an excentric slide on each of the chucks in Mr. Cochran's machine,—the chucks need not, therefore, be opposite each other; the object of this is very important,—it is to balance the log, and the effect is, so to balance the log that its weight has no tendency to derange or strain the machine: there is nothing of this kind in the plaintiff's machine. The support for the timber the defendant calls an oscillating rolling rest; the upper surface of this support is always in the same plane as the upper surface of the clamp. The log in the defendant's machine is turned by tangent screws and rack-wheels; the means of turning the log are substantially different in defendant's machine from those specified by the plaintiff, although in each plan the log is turned by means of levers and bars. The saw-gate, which, in the plaintiff's machine, moves the saw up and down, is of the same construction as the ordinary saw-gate, but the inner frame is different, as ordinary saw-mills have no inner frame: when this inner saw-frame is taken from the machine, it is similar in construction to ordinary saw-frames;—the defendant's frame is quite different from the plaintiff's—the defendant's is not a frame properly so called. The defendant's plan of mounting a bow-saw in a saw-gate is slightly different from the plaintiff's; the defendant uses antifriction rollers, which is an important improvement; and he does not turn his saw in the same way as the plaintiff. The defendant's plan is essential to the success of the invention; as, when saws are strained tight, they cannot be turned without the defendant's contrivance. In order to change the rate of bevil in defendant's machine, it is not necessary to stop the machine. The witness then stated, that he had read the specification of Mr. Hamilton's patent of 1833, and had carefully examined the part referring to sheet B, which was precisely the same in principle as Smith's plan for cutting bevils. In defendant's machine the log turns about an axis, not on an axis; it does so also in Hamilton's first patent. In both the defendant's patent and plaintiff's first patent the log lies above the axis about which it turns. In plaintiff's first patent the log is turned by a lever or rack-wheel, and the machine would, no doubt, cut curvilinear lines and bevils; and, if made sufficiently long, would cut ships' futtocks, although, perhaps, not in a profitable and practically useful manner. In both of plaintiff's patents the log is turned to cut the bevil, and the principle is the same in both, although the mechanical means of carrying it out are somewhat different. The defendant's mode of turning the log more nearly resembles the plaintiff's first patent than the second. The witness also said that he had examined Gibbs and Gatley's patent for cutting staves for casks. This machine has saws, mounted on frames separate from the saw-gate; two saws are employed, and a lateral motion is communicated to the saws and frame by means of springs and guides or templates, attach to the bed of the machine; the springs are used to connect them together, and, although the saws may be turned while they are cutting, yet they do not have a motion independent of the frame, but are made to turn with it; the saws and their frames are forced outwards by the springs and inwards by the guides. The witness did not think that timber could be cheaply, expeditiously, and accurately cut, by means of this machine, for ship-building purposes.

Upon being cross examined by Mr. Serjeant Shee, the witness said he had seen defendant's machine at work; the model on the table was constructed on the same principle, and the model produced of the clamp is the same as those used in defendant's machine. He also said that, in his opinion, the other model on the table fairly represented Mr. Hamilton's first patent machine; he had never seen Gibbs' machine at work:—in the latter the saws are placed in frames; but the saw has no independent motion in the frame. There would, in witness' opinion, be no difficulty in cutting curves of any shape;—he could cut a curve and a straight in the machine at the same time.

Mr. Alexander Gordon, civil engineer, stated, that he had set out timber for ship-building purposes; he had also set up saw-mills and other improved machinery. He had read J. Smith's specification, and seen defendant's machine in practical operation at Woolwich dockyard; had also read and examined Mr. Hamilton's specification of 1834, and made notes of the points of difference between plaintiff's and defendant's machines. Is of opinion that plaintiff's machine could not be used to commercial advantage. The plaintiff's and defendant's machines are substantially different. Does not think that the plaintiff could cut a pair of bevils on a log held as shewn in his machine. The witness stated, that with defendant's machine he could do, in one hour, the same amount of work as the plaintiff, with his machine, could do in four hours. He also said, that he thought plaintiff's machine would cut midship-timbers very well; but doubted whether it could cut futtocks. The oscillating roller-rest is a great improvement, and is peculiar to defendant's machine. The witness said, that the plaintiff's plan of supporting the log, by means of a weighted lever, was useless; and he would rather be without it. There is a great difference between defendant's and plaintiff's plan of making the bevil. The defendant has a guide-bar and index-bar; and he makes the bevil by causing the index-bar, in connection with the dog or clamp, to follow the index-bar. The witness stated, that he knew that the defendant's mode of guiding the saw succeeds; but much doubted whether the plaintiff's plan would effect the intended purpose. He considered defendant's machine a great improvement upon Mr. Hamilton's first patent; and that it differs essentially from plaintiff's plan of 1843. Mr. Hamilton's first and second patents are essentially different from each other. The witness then said, that he had seen Gibbs and Gatley's specification, in which there are two saws fixed in one frame, and may be so guided by templates, that curves may be cut in the machine exactly like the template. The frames that support the saws move laterally within the capacity of the machine.

Upon cross examination by Mr. Serjeant Shee, the witness stated, that the plaintiff's dogs might hold a straight futtock of the ordinary length; and a crooked piece might be held by a frame at each end. It might be held by a cross. He would not say that a crooked log could not be sawn by the plaintiff's machine.

A great number of other witnesses were examined, and deposed to the same facts. Among others was Mr. Murray, head engineer of Portsmouth dockyard, who said, that the mechanical arrangements for mounting and working the saw were essentially different in the two machines; and that defendant's mode of turning the saw is best, as, in order to cut rapidly, it is necessary to strain the saw very tight, to the amount of two tons; and he thought, if the saw were tightened up to that extent, it would not be possible to turn the saw by a lever applied direct to the middle of the saw.

Mr. Yongs Porfrey, manager of the patent wheel manufactory, Pimlico, caused much merriment by the manner of giving his evidence. He stated, that he came to be "*analyzed;*" and he hoped he should be well and strictly "*analyzed.*" He was a practical man, and well acquainted with sawing machinery. He had invented a machine fourteen years ago for cutting curves and bevils. He had examined plaintiff's specification and model to some extent; and had seen defendant's machine in operation at Woolwich. He thought there was great similarity between plaintiff's patent of 1833 and that of 1843. The defendant's mode of mounting and turning the log and saw is quite different from plaintiff's second patent of 1843. The witness laid it down in the most positive manner, that it was impossible to turn the saw with a forked lever, when it was stretched to a tension of 12 cwt., as he had tried to do so and failed. He had made a machine which would cut any bevil or curve that might be required. His object was, to construct a machine applicable for cutting timber for any part of a carriage.

Mr. Gibbs, co-patentee with Mr. Gatley for a machine for cutting staves for casks, explained the construction of his machine. He said, there are two saw frames on a saw-gate, with a sliding lateral motion given to the saws. A machine of this kind was made to exemplify the process, and was placed in the dockyard, but was never worked. The remaining portion of this witness' evidence was but a repetition of that already given.

Mr. Robertson, patent agent, produced a volume of the *Franklin Journal,* which he stated had been in his possession fifteen years. He had never seen another copy of the *Franklin Journal.*

It contained an account of a machine for cutting furrow-boards; which, it appeared, formed the subject of an American patent; but the description was so vague as to be nearly unintelligible. This witness also produced a number of the *London Journal of Arts*, containing a description of Alexander Craig's patent, August, 1836, for cutting veneers from a log, by mounting it on centres, and causing it to rotate slowly; while the saw is made to cut a thin veneer (concentrically) from the side of the log. The witness also produced a copy of Isaac Dodd's specification, for cutting irregular shapes in wood. The only point that was noticed in this patent was, that the saw was mounted on pivots, so that it could follow the sinuosities and curves to be cut in the wood; but as the plaintiff laid no claim to this, no notice was taken of the patent.

The defendant's case was concluded by calling several practical men, who had worked his machine, and who deposed as to its utility and efficiency.

Mr. Serjeant Channell then replied upon the whole case.—He said that, after the protracted discussion which had taken place, it was not his intention to take up much of their time; but it was his duty to make a few remarks upon some of the observations that had fallen from his learned friend during the progress of the case. The learned counsel said, he was not instructed to find fault with the defendant's machine; and neither he nor his learned friends who were with him had any wish to depreciate the value of the defendant's invention; in fact, it was part of his case that the defendant's machine would perform its work well; but he contended, that this arose entirely from the defendant having taken all the essential features of the plaintiff's machine, and added to them certain other parts, about the utility of which there appeared to be some doubt in the minds of the scientific gentlemen who had been examined. He, however, had no wish to find fault with the defendant's various contrivances. If they were useful, he was perfectly welcome to them; but he must not (in order to make these contrivances valuable) take the plaintiff's invention as a substratum. Now, the questions the jury would have to consider were, first, was Mr. Junius Smith in possession of the invention when he applied for and obtained his patent. He apprehended there could be no doubt upon that point. Mr. Smith swore he received a communication from the plaintiff; and it was proved the specification had been prepared from that document. The next point to which he would direct attention was, as to the novelty of the invention. Now, what had been brought forward on the other side on this point? Really nothing that was at all material. While on this point, he could not help saying, that he had hardly been fairly treated by his learned friend; for, with the exception of the patent granted to the plaintiff in 1833, which was set out in the pleadings, and to which, therefore, he had an opportunity of directing the attention of his witnesses, not one single thing had been alluded to by the other side, until the plaintiff's case was closed. Why were not the plaintiff's witnesses asked, whether they knew of such a patent as Gibbs and Gatley's, and the others that had been mentioned? Why had they been thus taken by surprise?

Mr. Chambers here said, he did not understand how his learned friend could say they were taken by surprise, when, in fact, one of his own witnesses pulled out of his bag a printed description of Gibbs and Gatley's invention.

Mr. Serjeant Channell in continuation said, that, in reference to certain parts of the plaintiff's invention having been in use before the date of his patent, he could not see, from any of the evidence, that the plaintiff's case was at all affected by it. The plaintiff did not claim any of the parts separately;—the specification was perfectly clear upon that point. It was the combination that was claimed; it was the combination of the lateral motion of the saw-frame, with the independent motion of the saw on its axis, that was new and useful; and it was precisely that which the defendant had taken. Now there was nothing of that sort in Gibbs' or any other machine that had been brought forward. And, with respect to mounting and turning the log, the plaintiff did not claim as new mounting a log on centres;—everybody knew *that* had been done before; but it was the combination of rotary dogs, clamps, or frames, with an index-bar and guide-bar, whereby the dog may (while being cut) be turned round on an axis, so as to make any required bevil. Now, the defendant in this, as well as in the mode of mounting the saw, had made various changes, and added certain contrivances (the value of which it was not his intention to call in question); but he adhered to the principle of the plaintiff's machine; and, therefore, whether the plaintiff's invention were worth 1*s*. or £10,000, he contended, that the defendant had no right to take it without first satisfying the plaintiff and paying his 1*s*. The learned counsel proceeded to say, that great efforts had been made to shew that the plaintiff's invention was useless, or nearly so; but he had proved, by the defendant's own hand-writing, that he considered the invention extremely valuable;—how then could he now come and say that it was useless. On this part of the case he relied almost entirely on the defendant's letters and his admissions;—the defendant, in fact, was his best witness. The learned counsel concluded an eloquent address by saying, that he left the case with confidence in the hands of the jury; he did not ask for heavy damages—that was not the plaintiff's object; he only asked for such nominal damages as would carry costs and affirm the plaintiff's patent.

The Chief Baron, in summing up, went through the whole of the evidence, with great minuteness and care. He said, the jury must not be astonished at the apparently contradictory nature of the evidence of the scientific gentlemen, as those gentlemen had their own way of looking at these matters; he, however, congratulated the jury upon having had an opportunity of witnessing the operation of both models, and seeing pieces of wood cut by them; they could, therefore, judge for themselves, and that was always the best way when it could possibly be done. The learned Chief Baron said, that the defendant complained he had not had an opportunity of seeing the plaintiff's machine, while the plaintiff had ample opportunities of seeing his. He thought this was certainly unfortunate, and, to a certain extent, wrong; but then it must be recollected that the defendant could examine the plaintiff's specification. On the other hand, the plaintiff complained of being kept in the dark, as to the nature of the evidence the defendant intended to bring forward; and said he was taken by surprise at the patents that were, one after the other, brought against him. He (the learned judge) did not think they greatly affected the case, and, as far as the question of surprise was concerned, he thought it might be taken as a set off for not allowing defendant to see plaintiff's machine. The learned judge concluded by submitting to the jury the following questions:—First, whether Mr. Smith was sufficiently possessed of the invention at the time he took out the patent; secondly, whether the machine was independent of, and substantially different from, one of a similar character patented in 1833; thirdly, whether the invention was new and useful; and, fourthly, whether the defendant had borrowed any portion of plaintiff's invention.

The jury retired, but were not absent more than five minutes, when they returned, and gave a verdict for the plaintiff on all the points submitted to them, with 40*s.* nominal damages.

LIST OF REGISTRATIONS EFFECTED UNDER THE ACT FOR PROTECTING NEW AND ORIGINAL DESIGNS FOR ARTICLES OF UTILITY.

1848.

July 28. *John Phillips*, of Warwick-street, Belgrave-square, for an improved syphon trap.

29. *John Joseph Hussey*, of Hertford-street, Fitzroy-square, carpenter, &c., for a portable meat-screen.

Aug. 1. *Samuel Ward*, of 18, Lowther Arcade, Strand, for a spring-clip for candlesticks or candle-holders.

1. *John Rock Day*, of Birmingham, and *Job Clark*, of Willenhall, for a bolt or fastening.

1. *George Harborow*, of 340, Holborn Bars, London, for a pair of braces.

2. *John Smith*, of Bradford, Yorkshire, flour machine manufacturer, for a corn-mill cylinder brush.

3. *William Procter Stanley*, of Peterborough, and *John Medworth*, of Crown-street, Walworth, London, for a farmer's steaming apparatus.

Aug. 4. *Thomas Burnham Clark*, of 6, Laurence Pountney-lane, London, for a direction label.

5. *John Brown*, of 167, Western Bank, Sheffield, for a conical spring for railway-carriages, made of round, square, oval, hexagon, or octagon steel.

5. *John Robert Grover*, of 4, Castle-street, Holborn, for a new design for the shape or configuration of sheets of letter-paper.

7. *Thomas Porter*, of 94, Strand, for a shirt.

8. *Thomas Dismore*, of Liverpool, for a tassel fastener for brooches, clasps, or buttons.

8. *Charles Twigg*, of Birmingham, for a sewn-through shank papier-maché button.

8. *Robinson & Russell*, of Millwall Works, Poplar, for a wrought-iron wheel for railway-carriages.

9. *D. G. Wertheimber*, of South-street, Finsbury, London, for an artificial leech.

9. *Cornelia Smith*, of Crewe, Cheshire, for a female elastic supporting band.

11. *James Lamb Hancock*, of Coed-y-lade, Montgomeryshire, for a frame for a carpet or other bag.

14. *Welch, Margetson, & Co.*, of 134, Cheapside, London, for the back of a pair of braces.

14. *John Whitehead*, of Preston, for a tile machine.

15. *John West*, of 27, Church-street, Lambeth, and *John Henry West*, of Lant-place, Southwark, for a moon or globe for gas or other lights.

16. *John Warner & Sons*, of 8, Crescent, Cripplegate, London, brass-founders, &c., for an improved beer-engine.

17. *Abraham Bettridge & Co.*, of Birmingham, for a pen-holder.

17. *Richard Burrows*, of Ruddington, Nottinghamshire, farmer, for an improved regulating apparatus or stop-gauge for scufflers, drags, rakes, and other similar farming implements.

17. *Lynch & English*, of Manchester, engineers, for an hydrostatic indicator or pressure-gauge.

18. *William Day*, of 46, King William-street, London Bridge, for an improved beer-tap.

21. *Robert Weare*, of Birkenhead, for a galvanic diffuser.

22. *Shaw Thewlis & Peter Griffith*, of Phœnix File and Tool Works, Warrington, for a cheese-press.

22. *James Campbell*, of Beak-street, Regent-street, wine-merchant, for a champagne and aerated water fountain-tap, for drawing off the contents of bottles without taking out the cork.

22. *Thomas Spicer Dismore & George Dismore*, of 11, Clerkenwell-green, London, for an improved waistband centre.

Aug. 23. *William Armitage*, of Louth, operative chemist, for a safety signal light.

24. *Samuel Messenger*, of Birmingham, for an improved railway signal lamp.

25. *Isaac Rider*, of East-street, Bedminster, Bristol, for an improved bib-cock.

26. *Alexander Lewis*, of Fenchurch-street, London, for a protective machine for cleansing, painting, and glazing sashes, or forming reveals to windows, &c.

26. *Messrs. Wilson*, of 95, Wardour-street, Soho, for an improved artist's sketch-box.

26. *Arthur Perks Dudley*, of Birmingham, for a trouser-strap.

28. *J. & W. A. Blair*, of 125, Trongate, Glasgow, for a compass hat.

28. *Wm. English & Son*, of Brighton and Lewes, cutlers and surgical instrument makers, for Dr. Madden's uterine douchè bath.

List of Patents

That have passed the Great Seal of IRELAND, from the 17*th July, to the* 17*th August*, 1848, *inclusive.*

To William Bridges Adams, of Adam-street, Adelphi, in the county of Middlesex, engineer, carriage-builder, and contractor, for certain improvements in the transport storeage and preservation of perishable articles; and in the construction of wheel-carriages and locomotive engines; and also in roads or ways.—Sealed 7th August.

George Edmund Donisthorpe, of Leeds, in the county of York, manufacturer, for improvements in roving and spinning wool and flax, and in treating wool previous to spinning, and in heckling flax.—Sealed 10th August.

List of Patents

Granted for SCOTLAND, subsequent to July 22*nd*, 1848.

To James Napier, of Shacklewell-lane, London, operative chemist, for improvements in smelting copper and other ores.—Sealed 26th July.

John Miller, of Henrietta-street, Covent Garden, London, for a new system of accelerated menattrite locomotion, even by animal impulsion, for any species of transport machines acting by means of wheels, whether on land or water,—being a foreign communication.—Sealed 27th July.

George Emmett, of Oldham, civil engineer, for certain improvements in the manufacture of fuel, and in the construction and arrangements of furnaces, flues, boilers, ovens, and retorts, having for their object the economical application of caloric; the manufacture of gas for illumination; and the consumption of smoke and other gaseous products.—Sealed 28th July.

Charles William Siemens, of Manchester, engineer, for improvements in engines to be worked by steam and other fluids, and in economizing heat.—Sealed 31st July.

Thomas Marsden, of Salford, machine-maker, for improvements in machinery for dressing or combing flax, wool, and other fibrous substances.—Sealed 31st July.

Henry Highton, of Rugby, clerk, M.A., and Edward Highton, of Regent's-park, London, civil engineer, for improvements in electric telegraphs.—Sealed 31st July.

Felix Alexander Testud de Beauregard, of Paris, engineer, for improvements in generating steam, and in the means of obtaining power from steam-engines.—Sealed 31st July.

James Warren, of Montague-terrace, Mile-End-road, London, and Willoughby Theobald Monzani, of St. James's-terrace, Blue Anchor-road, Bermondsey, London, for improvements in the construction of bridges, aqueducts, and roofings.—Sealed 2nd August.

William Bridges Adams, of Adam-street, Adelphi, London, engineer, for certain improvements in the construction of wheel-carriages and locomotive engines, and also of roads or ways. —Sealed 8th August.

Jean Napoleon Zermani, of Greenwich, Kent, captain in the French navy, for improvements in ships and other vessels.—Sealed 8th August.

Joseph Simpson, of Manchester, civil engineer, and James Alfred Shipton, of Manchester, engineer, for certain improvements in steam-engines.—Sealed 14th August.

Matthew Kirtley, of Derby, engineer, for improvements in the manufacture of railway wheels.—Sealed 15th August.

John Weston, of Portland-town, machinist, for certain improvements in obtaining and applying motive power.—Sealed 15th August.

Samuel Thornton, of Birmingham, merchant, and James Edward Mc Connell, of Wolverton, engineer, for improvements in steam-engines, and on the means of retarding engines and carriages on railways, and in connecting railway-carriages or waggons together; also improvements in effecting a communication between one part of a railway-train and another, by signals or otherwise.—Sealed 18th August.

James Porritt, of Edenfield, woollen manufacturer, for certain improvements in carding-engines, for carding wool and other fibrous substances.—Sealed 18th August.

Samuel Lees, of the firm of Hannah Lees & Sons, of Parkbridge, iron manufacturer, for certain improvements in the manufacture of malleable iron.—Sealed 18th August.

Henry Henson Henson, of Hampstead, for certain improvements in railway-carriages and waggons.—Sealed 21st August.

New Patents

SEALED IN ENGLAND.

1848.

To Charles Hancock, of Brompton, Middlesex, Gent., for improvements in apparatus and machinery for giving shape and configuration to plastic substances. Sealed 29th July—6 months for inrolment.

John Grist, of New North-road, Middlesex, engineer, for improvements in furnaces and fire-places. Sealed 29th July—6 months for inrolment.

James Robertson, of Great Howard-street, Liverpool, cooper, for improvements in the manufacture of casks and other wooden vessels, and in machinery for cutting wood for those purposes. Sealed 29th July—6 months for inrolment.

George Walter Pratt, of the city of Rochester, in the United States of America, Gent., for improvements in the manufacture of printing-ink. Sealed 29th July—6 months for inrolment.

Richard Abbey, of Slough, Buckinghamshire, brewer, for improvements in preserving fermented and other liquids and matters in vessels. Sealed 29th July—6 months for inrolment.

Edward Gribben Wilson, of Bury, Lancashire, tin-plate worker, for certain improvements in the construction of tin drums or rollers used in the machinery for drawing, spinning, doubling, twisting, and throwing cotton, wool, silk, flax, and other fibrous substances. Sealed 1st August—6 months for inrolment.

Duncan Mackenzie, of Goodman's Fields, Middlesex, manufacturer, for certain improvements in Jacquard machinery, for figuring fabrics and tissues generally, and apparatus for transmission of designs to said Jacquard machinery; parts of which are applicable to playing musical instruments, composing printing types, and other like purposes,—being a communication. Sealed 5th August—6 months for inrolment.

David Newton, of Macclesfield, in the county of Chester, merchant, for certain improvements in the application of glass or glazed surfaces to nautical, architectural, and other similar purposes. Sealed 7th August—6 months for inrolment.

Samuel Thornton, of Birmingham, merchant, and James Edward Mc Connell, of Wolverton, Buckinghamshire, engineer, for improvements in steam-engines, and in the means of retarding engines and carriages on railways, and in connecting railway-carriages or waggons together; also improvements in effecting a communication between one part of a railway train and another by signals or otherwise. Sealed 7th August—6 months for inrolment.

John Metcalfe, of Little Bolton, machine-maker, and Robert Halliwell, of the same place, mechanic, for certain machinery or apparatus for preparing and spinning cotton and other fibrous substances. Sealed 8th August—6 months for inrolment.

Moses Poole, of the Bill Office, Gent., for improvements in the manufacture of casks and other similar vessels of wood,—being a communication. Sealed 8th August—6 months for inrolment.

Samuel Lees, of the firm of Hannah Lees and Sons, of Park-bridge, Lancashire, iron manufacturer, for certain improvements in the manufacture of malleable iron. Sealed 8th August—6 months for inrolment.

Joshua Cooch, of Harleston, Northamptonshire, agricultural implement-maker, for improvements in sack-holders. Sealed 10th August—6 months for inrolment.

William Thomas Henley, of Clerkenwell, Middlesex, philosophical instrument-maker, and David George Forster, of Clerkenwell, metal merchant, for certain improvements in telegraphic communication, and in apparatus connected therewith; parts of which improvements may be also applied to the moving of other machines and machinery. Sealed 10th August—6 months for inrolment.

Samuel George Hewitt, of Buchanan-street, Glasgow, North Britain, engineer, for improvements in the construction of certain parts of railways. Sealed 11th August—6 months for inrolment.

John Varley, of Bury, Lancashire, engineer, for certain improvements in steam-engines. Sealed 14th August—6 months for inrolment.

James Henderson, of Surrey Canal Dock, millwright, for improvements in machinery for cleansing and polishing rice, pearl barley, and other grain and seed. Sealed 14th August—6 months for inrolment.

Joseph Simpson, of Manchester, engineer, and James Alfred Shipton, of the same place, engineer, for certain improvements in steam-engines. Sealed 14th August—6 months for inrolment.

Edwin Thomas Truman, of No. 40A, Haymarket, London, dentist, for an improved method or methods of constructing and fixing artificial teeth and gums, and of supplying deficiencies in the mouth. Sealed 15th August—6 months for inrolment.

James Warren, of Montague-terrace, Mile End-road, Middlesex, Gent., and Willoughby Theobald Monzani, of Saint James's-terrace, Blue Anchor-road, Bermondsey, Surrey, Gent., for improvements in the construction of bridges, aqueducts, and roofings. Sealed 15th August—6 months for inrolment.

Thomas De la Rue, of Bunhill-row, Middlesex, manufacturer, for improvements for producing ornamental surfaces to paper and other substances. Sealed 15th August—6 months for inrolment.

William Galloway and John Galloway, of Knott Mill Iron Works, Hulme, Manchester, engineers, for certain improvements in steam-engines. Sealed 17th August—6 months for inrolment.

Moses Haym Picciotto, of Finsbury-square, London, merchant, for a method or methods of purifying and decolorizing certain gums. Sealed 17th August—6 months for inrolment.

Thomas Richardson, of Newcastle-upon-Tyne, chemist, for improvements in the condensation of metallic fumes, and in the manufacture of white lead. Sealed 21st August—6 months for inrolment.

William Young, of Queen-street, Cheapside, lamp manufacturer, for improvements in closing spirit and other cans or vessels. Sealed 21st August—6 months for inrolment.

Isaac Taylor, of Stanford Rivers, Essex, Gent., for improvements in preparing and engraving surfaces; also in the construction of cylinders adapted for engraving; and also in machinery for printing and ornamenting surfaces. Sealed 21st August—6 months for inrolment.

Richard Shaw, of Gold's-green, West Bromwich, Staffordshire, railway bar finisher, for improvements in the manufacture of iron into tyre bars, round bars, square bars, and flat bars, T-iron, angle iron, and trough iron. Sealed 21st August—6 months for inrolment.

John Bethell, of Parliament-street, Westminster, Gent., for improvements in preserving animal and vegetable substances, and also stone, chalk, and plaster, from decay. Sealed 21st August —6 months for inrolment.

Alexander Angus Croll, of the Gas Works, Tottenham, Middlesex, for improvements in the manufacture of gas and in apparatus to be used in transmitting gas. Sealed 22nd August—6 months for inrolment.

Hugh Lee Pattinson, of Washington House, Gateshead, Durham, chemical manufacturer, for improvements in manufacturing a certain compound or certain compounds of lead, and the application of this and certain other compounds of lead to various useful purposes. Sealed 22nd August—6 months for inrolment.

Alonzo Buonaparte Woodcock, of Manchester, for improvements in steam-engines, and in apparatus for raising, forcing, and conveying water and other fluids. Sealed 22nd August—6 months for inrolment.

Alfred Vincent Newton, of 66, Chancery-lane, Middlesex, mechanical draughtsman, for certain improvements in dressing or cleaning grain, and in separating extraneous matters therefrom, —being a communication. Sealed 22nd August—6 months for inrolment.

Edward Deuch, of Hurstperpoint, Sussex, hot-house builder, for improvements in the roofing of conservatories, hot-houses, and other like structures. Sealed 26th August—6 months for inrolment.

CELESTIAL PHENOMENA for September, 1848.

D.	H.	M.	
1			Clock after the ☉ 0m. 14s.
	—		☽ rises 9h. 5m. M.
	—		☽ passes mer. 2h. 45m. A,
	—		☽ sets 8h. 16m. A.
	13	20	☿ in sup. conj, with the ☉
3			Re-appearance of ♄'s ring
	5		☽ in Apogee
5			Clock after the ☉ 1m. 31s.
	—		☽ rises 1h. 7m. A.
	—		☽ passes mer. 5h. 45m. A.
	—		☽ sets 10h. 17m. A.
	8	43	☽ in □ or first quarter
	22	38	Juno in □ with the ☉
6	15	55	♃'s first sat. will im.
6	17	5	♀ in conj. with ♂ diff. of dec. 0. 31. N.
9			Occul. r^1 Capricorni, im. 13h. 27m. em. 14h. 27m.
9	15	34	♃'s second sat. will im.
10			Clock after the ☉ 3m. 13s.
	—		☽ rises 4h. 58m. A.
	—		☽ passes mer. 9h. 56m. A.
	—		☽ sets 1h. 52m. M.
	—		Occul. *a* Aquarii, im. 9h. 11m. em. 10h. 16m.
12			Disappearance of ♄'s ring
	22	17	♄ in conj. with the ☽ diff. of dec. 2. 28. S.
13	3	34	Begins } ☽ eclipsed; magnitude of the eclipse (moon's dia. = 1) 1·702 on the southern limb
	6	19	Middle
	9	3	Ends
	6	19	Ecliptic oppo. or ○ full moon
14	2	46	♄ in oppo. ☉
	3	16	☿ in conj. with ♀ diff. of dec. 0. 2. S.
	19	43	♅ in conj. with the ☽ diff. of dec. 2. 5. N.
15			Clock after the ☉ 4m. 58s.
	—		☽ rises 7h. 32m. A.
	—		☽ passes mer. 1h. 29m. M.
	—		☽ sets 8h. 10m. M.
	—		Occul. ζ^1 Ceti, im. 14h. 12m. em. 15h. 2m.
	3		☽ in Perigee
17			Occul. 48 Tauri, im. 16h. 54m. em. 17h. 31m.
17			Mercury R. A. 12h. 26m. dec. 2. 28. S.
	—		Venus R. A. 12h. 38m. dec. 3. 2. S.
	—		Mars R. A. 12h. 16m. dec. 1. 1. S.
	—		Vesta R. A. 0h. 9m. dec. 11. 44. S.
	—		Juno R. A. 5h. 13m. dec. 9. 25. N.
	—		Pallas R. A. 13h. 40m. dec. 8. 9. N.
	—		Ceres R. A. 13h. 45m. dec. 4. 51. S.
	—		Jupiter R. A. 9h. 4m. dec. 17. 18. N.
	—		Saturn R. A. 23h. 33m. dec. 5. 31. S.
	—		Georg. R. A. 1h. 19m. dec. 7. 42. N.
	—		Mercury passes mer. 0h. 40m.
	—		Venus passes mer. 0h. 52m.
	—		Mars passes mer. 0h. 30m.
	—		Jupiter passes mer. 21h. 15m.
	—		Saturn passes mer. 11h. 44m.
19	5	32	Vesta in oppo. ☉ intens. of light 0·901
	9	58	☽ in □ or last quarter
20			Clock after the ☉ 6m. 44s.
	—		☽ rises 11h. 15m. A.
	—		☽ passes mer. 6h. 11m. M.
	—		☽ sets 2h. 3m. A.
	8	45	☿ in the descending node
22	10	19	☉ enters Libra, Autumn com.
	14	11	♃'s first sat will im.
23	0	39	♃ in conj. with the ☽ diff. of dec. 3. 49. N.
24	16	44	♃'s third sat. will im.
25			Clock after the ☉ 8m. 28s.
	—		☽ rises 3h. 37m. M.
	—		☽ passes mer. 10h. 27m. M.
	—		☽ sets 5h. 7m. A.
26			☉ eclipsed, invis. at Greenwich
27	9	35	Ecliptic conj. or ● new moon.
27	9	46	♂ in conj. with the ☽ diff. of dec. 1. 11. S.
28	11	20	☿ in conj. with the ☽ diff. of dec. 4. 4. S.
	11	24	♀ in conj. with the ☽ diff. of dec. 2. 18. S.
	15	0	☿ in conj. with ♀ diff. of dec. 1. 47. S.
30	12	26	☿ in Aphelion
	22		☽ in Apogee

J. LEWTHWAITE, Rotherhithe.

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RECENT PATENTS.

To JOHN CRAFT ROBERTS, *of Holywell, in the county of Flint, surgeon, for a simplified and improved mode of communicating intelligence (by means of electricity and magnetism, combined or not with steam) on railways between the carriages on the line and the engine or tender, so that the guards and passengers may give notice to the engineer or engine-driver for the prevention of accidents or casualties, or the mitigation of the evils thereof, and the protection of human life and property from loss or injury; and also of communicating signals by the same agency, describing the cause or causes of alarm; and a new mode of securing the passage of electricity for the above purposes, to be substituted or not for the side chains; and of communicating intelligence between distant places on the line.*—[Sealed 28th February, 1848.]

THIS invention consists principally of an improved mode and apparatus for communicating alarum signals, or intelligence by means of alarum signals, from any carriage, forming a portion of a railway-train, to the engineer or attendant at the locomotive engine or tender; such apparatus being capable of being used either by the passengers in any carriage of the train, or by the guard or guards exclusively.

In Plate VII. the improved apparatus employed for the carrying out of this invention is clearly shewn. Figs. 1, to 5, exhibit two arrangements of apparatus for producing audible signals; and the remaining figures shew the means of applying electro-magnetism to work the signal apparatus. The patentee first describes the construction and action of the audible signal apparatus, and afterwards the means he employs for completing the circuit and breaking the current of electricity in a train of carriages, so as to create a temporary magnet, which, by its attractive power, shall throw the signal apparatus into action.

Fig. 1, represents, in side elevation, one arrangement of the improved apparatus for communicating audible signals, and fig. 2, is a vertical section of the same. This apparatus is brought into connection with the interior of the boiler of the locomotive engine, in order that the steam or other elastic vapour, contained therein, may be allowed, at certain periods, to escape in small quantities, and produce the alarm required. A, is a hollow vertical pillar, which may be screwed into the boiler B, of the locomotive engine, as shewn, or otherwise connected with the interior of the boiler. At the top of this pillar is a steam-whistle C, which is intended to produce the alarm. D, is a steam-cylinder, and E, its valve-chest, brought into connection with the central passage of the pillar A, by means of a pipe *a*. The construction of these parts of the apparatus will be best seen on referring to the vertical section, fig. 3. The steam-cylinder D, is provided with a piston *b*, the rod of which carries connecting-links *c*, for the purpose of working a lever *d*, one end of which is connected to the links *c*, and the other to the square end of a conical stop-cock *e*, in the hollow pillar A. This cock, when turned in its seat, shuts off all communication with the steam-boiler and the upper part of the hollow pillar. *f*, is a stud, projecting from the pillar A, and carrying a vibrating lever *g*, one end of which is connected to a rod *h*, which carries the slide-valve of the steam-cylinder, and the other is jointed to a rod *i*, pendent from a rocking-arm *k*, which is supported by a stud *l*, also projecting from the pillar A. Pendent from the outer end of the arm *k*, is a horizontal bar or armature *m*, which hangs immediately above the poles of an electro-magnet F. This magnet is formed, in the usual way, of coils of copper wire, surrounding a bar of soft iron. The magnet is supported, in an isolated state, by a bracket, attached to the pillar. When it is desired to communicate a signal to the engine-driver, the electric circuit is completed, as will be hereafter explained, and a current of electricity is carried through the coils of wire surrounding the bar of soft iron F, which is then immediately converted into a powerful electro-magnet. The horizontal bar or armature will be then drawn down towards the poles of the magnet, and thereby depress the shorter end of the lever *g*, while it raises the longer end of that lever. This action will raise the slide-valve of the valve-chest E, and allow of steam, which passes from the boiler of the locomotive up the hollow pillar A, and along the pipe *a*, into the valve-chest, to enter the steam-cylinder below the piston, and force that piston upwards; whereby the rods *c*, and the lever *d*, will be put into action, and cause the stop-cock *e*, to turn, until its bore is brought into a line with the central passage in the pillar A; steam will then rush directly up that passage, and cause the whistle to sound until the magnetic power of the bar of soft iron F, is destroyed (by breaking the current of electricity), and the armature *m*, is allowed to rise into its elevated position. In order to ensure the return of the moving parts to their quiescent position, a coiled spring is attached to the rigid pipe *a*, and the lever *g*; which spring, by its contracting force, will draw down the lever *g*, as soon as the armature *m*, is released. The descent of the piston is also ensured by a coiled spring, which is contracted as the piston rises; but which, when the elastic force of the steam is removed, (by the descending valve of the valve-chest closing the ingress passage to the cylinder D,) will expand and force down the piston to its lowest position,—the steam beneath it being allowed to escape at an opening made for that purpose in the valve-chest.

The patentee remarks, that when the metal of an armature is placed in actual contact with the poles of an electro-magnet, the magnetism is retained for some time after the electric current is removed, and the armature is thereby held fast.

To obviate the difficulty arising from such properties, and procure the instantaneous release of the armature, a piece of ivory or other non-conducting substance is interposed between the armature and one or both poles of the magnet, so as to prevent actual magnetic continuity.

Fig. 4, represents, in front view, a modification of the above described apparatus (the steam, as a motive power, being, in this instance, dispensed with); and fig. 5, is a vertical section of the same. Instead of the central passage in the pillar A, for the issue of the steam to the whistle, being carried up in a continuous vertical line, it is bent out in a horizontal direction, and returned again to its vertical line, for the purpose of forming a seat for a valve E; the action of which is to cut off the passage of the steam, or let it on to the whistle, as required. Connected to the valve E, is a vertical rod *a*, which slides in a steam-tight box, and is jointed to one end of a horizontal rocking lever *b*, supported by the stud of bracket-arms *c*, which are bolted to the pillar A. The other end of the rocking lever *b*, carries the armature *m*, which is acted on, as before described, by the electro-magnet F. *d*, is a coiled spring, for returning the valve to its seat. The whistle is placed, as before, at the top of the pillar A. When an audible signal is required to be given by this apparatus, the circuit is completed; and the current of electricity will then run through the coils of wire surrounding the bar of iron F, and convert it into an electro-magnet. Its attractive force will then draw down the armature *m*, and thereby lift the valve from its seat. The steam from the locomotive engine boiler will then rise up the pillar and pass to the whistle, which will continue to sound an alarm until the circuit is broken. *e*, is a cock, under the command of the engineer, for cutting off the steam from the whistle when required, irrespective of the other parts of the apparatus.

The mode of forming the metallic connection, for the electric current to pass to the signal apparatus, at the desire of any person in the train, will now be described. Fig. 6, represents, in sectional elevation, two railway carriages, furnished with electric conducting wires, the wires of one carriage being connected to those of the other, to allow of the electric current passing from one to the other. The end of a locomotive boiler is also shewn, as carrying the signal apparatus, which is brought into the electric circuit by the conducting wires, as shewn. Fig. 7, is a plan view of the carriage framing, shewing the position of the conducting wires. A, is the galvanic trough or battery, which may be fixed beneath the body of any one of the carriages of a train, or beneath the engine or tender; and to the negative and positive ends of the battery the conducting wires *a, a,* are attached, as usual. These wires are, at their other ends, secured to isolated metal staples *b, b,* in the end framing. *c,* is another wire, running parallel with the line of wires *a,* and connected at each end with isolated staples *d, d.* Every carriage in the train is provided with two lines of wires, which are secured in their places by isolated staples. There are also vertical wires *e, e,* joined to the horizontal wires, and connected, at their upper ends, with an apparatus B, which, when required, brings the two wires into metallic contact, and thus (when the signal apparatus is brought into connection with the battery by the wires *f, f,*) completes the electric circuit. The means which are employed for obtaining a metallic connection, of variable length, between the conducting wires of the several carriages of the train, is a spring clip and jointed staple, pendent from their respective carriages, as shewn in the drawings; but any other convenient means may be adopted. The apparatus B, which completes and breaks the circuit, as required, is placed, for convenience, in the side of the carriage, at the command of the passengers; it is shewn detached, and on an enlarged scale, at figs. 8, 9, and 10. By the peculiar construction of this apparatus, which is denominated the detective communicator, the guard may readily ascertain from what carriage the alarm, whether necessary or fictitious, has proceeded. Fig. 8, represents the apparatus as it would appear within the carriage; fig. 9, is a cross section, in the line 1, 2, of fig. 8; and fig. 10, is a view in the line 3, 4, of fig. 9. *a,* is a knob of ivory or other non-conducting substance, attached to a sliding pin *b,* which carries a non-conducting ring or collar *c,* for a bolt *d,* to rest against. This bolt has always an inclination to move forwards; it being pressed against by a spring *e*, attached to the disc *f*. *g*, is a spring, also attached to the disc *f*, and intended to press against the pin *b*, and keep the knob *a*, in the position shewn in the drawing. To these springs *e*, and *g*, the vertical conducting wires are respectively connected. When therefore the knob *a*, is forced inwards to a recess made for its reception, the end of the bolt *d*, comes into contact with the metal pin *b*, and completes the electric circuit, whereby the signal apparatus on the engine is put into action. In order that the guard may ascertain, by inspection, from which carriage the alarm has been sounded, the pin *b*, is continued through the side of the carriage; and to its outer end a knob *h*, is attached, which will protrude when the circuit has been completed, and remain in that position until released. This is effected by the guard inserting a key and forcing back the bolt *d*, when the spring *g*, returns the parts to their former position.

In order to convey intelligence to the engineer by signals pre-arranged between him and the guards (such signals consisting of two or more rapidly succeeding sounds of the whistle) the patentee proposes that there shall be no locking in the apparatus B, for the guards' carriages, but that the surface of the non-conducting collar *c*, shall be flush with the surface of the pin *b*, so that the pin may be quickly returned to its original position by the spring *g*, and thus a rapid succession of sounds, by repeatedly completing and breaking the circuit, may be effected.

The last part of the invention, which refers to the communicating of intelligence between distant places on a line of railway, consists in the employment of the improved arrangements of apparatus, before described, in connection with the stationary telegraph wires of railways; but as the whistle of such apparatus requires a rush of steam or other vapour to bring it into action, it is obvious that the application is limited to those parts of a line where stationary engines are employed, such as at the mouth of tunnels, the commencement of heavy gradients, &c.: in the case of atmospheric railways, however, it may be used at almost every station. The mode of actuating the apparatus, when thus applied, being precisely similar to that described with reference to the train of carriages, no further explanation will be necessary.

The patentee claims, First,—the combined application of electro-magnetism and steam, or other elastic fluid, for turning the stop-cocks of railway whistles, whereby signals or intelligence by means of signals, may be conveyed from one part of a railway-train to another; and also the general arrangement of apparatus, as shewn at figs. 1, 2, and 3, for effecting this operation. Secondly,—the mode of working the signal-whistle of a railway-train, through the agency of electro-magnetism, as described with reference to figs. 4, and 5. Thirdly,—the mode of bringing the electric circuit within the command of the passengers or guards of a train, as described; and particularly the construction and employment of the detective communicator, whereby a visible proof of which carriage the signal proceeded from will be presented to the guard. And, Lastly,—he claims the application, to railways generally, of the improved arrangements of electro-magnetic apparatus above described; such apparatus being brought into connection with the stationary telegraph wires and the steam or vapour generators of stationary engines, as above explained.—[*Inrolled in the Petty Bag Office, August,* 1848.]

To STEPHEN WHITE, *of No.* 2, *Caroline-street, Mornington-crescent, gas patentee, for a new means of producing gas, both as to apparatus and materials from which the gas is produced.*—[Sealed 15th April, 1847.]

THIS invention applies to the production of gas for illumination, and consists, so far as it relates to the materials from which such gas is produced, in decomposing water by bringing it into contact, in the manner hereinafter described, with charcoal, coke, or anthracite coal, and small thin plates of iron, or small pieces of thin iron wire, or with charcoal, or coke, or anthracite coal and lime, at a very high temperature, and thereby producing, from such combination of materials so treated, hydrogen gas and oxide of carbon gas mixed; and afterwards in combining such compound gas with carburetted hydrogen gas, produced by bringing tar, oil, or fat, or certain other substances, hereinafter designated or described, in contact with heated materials, so as to produce, ultimately, a compound gas, composed of hydrogen gas, oxide of carbon gas, and carburetted hydrogen gas, mixed together; which compound gas is fitted for the purpose of illumination. The invention also relates to the use of certain apparatus for manufacturing the illuminating gas.

In Plate VIII., fig. 1, is a front view of the whole apparatus; fig. 2, a section, taken through the centre of the three retorts hereinafter particularly described; and fig. 3, is a transverse section of the brickwork in which the retorts are set, shewing an end view of the apparatus. *a, b, c,* represent three cylinders or retorts, all made of cast-iron, placed perpendicularly, and supported by the brickwork *d, d,* and by bars of iron *e, e, e,* placed longitudinally, and supporting the flanges or shoulders at the lower ends of the cylinders or retorts. The cylinders or retorts *a,* and *b,* which are intended for the decomposition of water, are nearly filled to the top, as shewn in fig. 2, with charcoal, or coke, or anthracite coal, and iron plates or wires;—the charcoal, or coke, or anthracite coal, being broken in small pieces and placed in the retorts, and the iron plates or wires being contained in the cylindrical colanders *f, f. g,* is a vessel, from which water is supplied in a small continued stream, regulated by the cock *h,* through the tube *i,* into the cylinder or retort *a,* see fig. 2. The water is conveyed through the said pipe into the iron pan *j,* and diffuses itself over and penetrates to some depth into the mass of heated charcoal, or coke, or anthracite coal, and iron plates or wires, by means of which it is converted into vapour; and such vapour having no outlet at the upper end of the cylinder or retort (which is closed, as hereinafter described) penetrates and passes through the whole body of charcoal, or coke, or anthracite coal, and iron plates, contained in the cylinders and colanders, down to the bottom of the said cylinders, when it is allowed to escape through the connecting tube *k, k,* into the next cylinder or retort *b,* and rise therein through the charcoal, or coke, or anthracite coal, and iron plates or wires, contained in the said cylinder or retort *b*. The vapour disengaged from the water in the retort *a*, becomes converted, by passing through the contents, into a compound gas, composed of hydrogen gas and oxide of carbon gas combined together, freed almost entirely from the presence of carbonic acid gas;—the effect of the iron plates or wires being to absorb nearly all the carbonic acid gas contained in the gas evolved by the decomposition of the water. The next stage of the process is to pass off the compound gas so produced into the retort *c*, see figs. 1, and 2.—This is effected by the tube *l*, which connects the upper end of the retort *b*, with the third retort *c*; in this third retort the mixture of the hydrogen and oxide of carbon gas with the carburetted hydrogen gas takes place.

The carburetted hydrogen gas is produced in the third retort in the following manner:—The vessel *m*, (see fig. 2,) contains either oil, or fat, or tallow, or common tar, or some other substance of a similar character, which, when decomposed by a high temperature, gives out carburetted hydrogen in large quantities. The oil, or fat, or tar (which are the substances the patentee proposes principally to use) must be kept in the vessel *m*, in a liquid state, and will flow therefrom in a small continued stream through the pipe *o*, into the retort *c*, where it falls on a small apparatus *p*, termed the disperser. This apparatus consists of a small brass pan, which has iron wires fixed thereto, diverging from the centre of the pan towards the inner circumference of the retort *c*; and its use is properly to diffuse and disperse the oil, or fat, or tar, over a mass of small chains 2, suspended in the cylinder or retort *c*, as shewn in the section, by means of the iron bar *q*, *q*, *q*, which hangs upon a hook fixed to the cover *z*, of the retort. The patentee prefers iron for the chain; but any other metal, capable of sustaining a white red heat, may be used. The retort *c*, and its contents, (the chains 2,) are to be kept, during the process, heated to a moderate red heat. The oil, or fat, or tar, dispersed by the disperser *p*, and falling on the heated chains, becomes decomposed, and gives out carburetted hydrogen gas, which mixes in the said retort with the hydrogen and oxide of carbon gas, brought into the retort from the retort *b*; and the compound gas, thus produced, passes away through the pipe *r*, (see fig 1,) into the receiving-box *s*, placed under ground, whence it passes up through the pipe *t*, into the condenser *u*, *u*, *u*, and thence directly into a gasometer, which may be of the ordinary kind.

v, *v*, are furnaces for heating the cylinders or retorts *a*, and *b*. There is no peculiarity in the construction and mode of fixing the retorts; but their heat must be capable of being varied during the process hereinafter described, and kept up to such a degree as to maintain the charcoal, or coke, or anthracite coal, and thin iron plates or wires, contained in the retorts, at a white heat. The iron plates used should, in order to operate to the greatest advantage, be thin flat pieces of hoop iron, about three inches long; or if iron wires are used, they should be of small diameter, say about one-tenth of an inch, and from two to three or four inches long.

It has been already mentioned that the cylinders or retorts *a*, and *b*, and their contents, are to be kept, during the process, at a white heat by the fires placed in the furnaces *v*, *v*; as also is the cylinder or retort *c*, with its contents, at a moderate red heat by the fire placed in the furnace *w*. The furnace is built of fire-bricks, and the fires flame upwards, and round the cylinders or retorts *a*, *b*, and *c*, through the flues surrounding them, as shewn at *x*, *x*, fig. 3. The cylinders or retorts are sufficiently supplied with draughts of air through the ash-pit *y*, *y*, *y*. As occasion requires, the charcoal, coke, or anthracite coal, and iron plates or wires, contained in the cylinders *a*, and *b*, are replaced through the openings *z*, *z*, at the upper ends of the retorts, previous to and during the process hereinbefore described of manufacturing gas. These openings are closed by caps, cemented with Stourbridge clay into the necks of the cylinders, and fastened down by means of the clamps and screws G, H, and I. A, fig. 1, is a small lamp, connected with the tube *l*, for the purpose of testing the hydrogen and oxide of carbon gas, as it passes through the tube *l*, into the cylinder or retort *c*. B, is a small jet, to test the compound gas, produced as hereinbefore described, before it passes into the gasometer.

If the cylinders or retorts used are of large dimensions, two cylinders or retorts may be found sufficient; one for containing charcoal, or coke, or anthracite coal, and iron plates or wires, for producing the hydrogen and oxide of carbon gas; and the other for containing the small iron chains, and for producing the carburetted hydrogen gas. The two cylinders will then be connected by means of a tube, at the bottom of such two cylinders or retorts, as shewn at K, K, fig. 1. If two cylinders or retorts only are used, the one should always be three parts full of charcoal, or coke, or anthracite coal, and iron plates or wires; and the other should be two-thirds full of the small chains. C, C, fig. 2, are coverlids at the lower ends of the retorts *a*, and *b*, respectively, made to open to remove the dross out of the said retorts *a*, and *b*; and such coverlids must be cemented with Stourbridge clay, when replaced. D, E, F, fig. 2, represent the coverings of the tops of the cylinders or retorts, which are made secure by means of the clamps and screws G, H, I. J, K, L, fig. 1, are three chimneys, made of plate-iron, leading from the flues of brick-work, uniting in one chimney M; N, N, N, are three fire-regulators; O, is a safety-cock, to prevent the return of the gas from the condenser to the retorts; and P, is a cock, to remove from the condenser any residuum which might interfere with the passage of the gas,—without passing through any purifying process or apparatus, as the gas produced, as aforesaid, is found sufficiently pure to dispense with the ordinary purifying process.

The use of the chains 2, 2, is, firstly, to subdivide the drops of oil, or fat, or tar, more minutely and completely than is done in the ordinary process of making oil gas (whereby the decomposition of the oil, or fat, or tar, can be effected by a moderate red heat, instead of a white red heat, and, in consequence, more perfectly than if the drops of oil, or fat, or tar, were not so subdivided); and, secondly, to prevent, to a great extent, the formation of a coating or incrustation of carbon on the heated surfaces to which the oil is exposed: an effect which results from the deposit formed during the decomposition of the oil or fat, and which does not take place to so great an extent, and is more easily remedied when it does take place, where an apparatus composed of such chains is used, than in the ordinary process of making oil gas. The chains should, in order to produce the effects above described in the most beneficial manner, neither hang parallel to each other, nor be laid one over the other in horizontal coils; but the most beneficial arrangement is laying the chains upon each other, in an oblique direction, forming, as it were, a series of cones, of varying bases, the apex being always a point on the centre line of the rod *q*, (fig. 2,) from which they are suspended: for this purpose, the rod *q*, which is square, is furnished all the way from the lower end to 3, with short hooks on its sides, each a little higher than the other, and the chains are hung from such hooks, commencing with the shortest, at the lower end of the rod *q*. The chains so hung will assume of themselves the position and arrangement best adapted for subdividing the oil, or fat, or tar, and moderating the formation upon them of an incrustation of carbon. The chains should be small; the links being about from half to three-quarters of an inch across the narrowest part.

It has been above stated that iron plates or wires are used for filling the colander *f*, in the retorts *a*, and *b*, (or in the single retort, if but one be used,) for absorbing the carbonic acid gas from the hydrogen evolved by the decomposition of the water; but instead of such iron plates and wires, lime may be used to assist with the charcoal, or coke, or anthracite coal, in the process of producing such hydrogen and oxide of carbon gas: it does not, however, answer so well as iron plates and wires, firstly, because the latter have a more perfect effect in absorbing the carbonic acid gas; and, secondly, because the iron plates or wires, after performing their office in the retort, form a valuable residuum as protoxide of iron, whereas the lime is not of any material value after performing its office.

The retorts have been described above as heated by furnaces, but they may be heated by means of the apparatus known as "Daniell's galvanic battery;" the positive and negative wires being conducted into the retorts to heat them, as shewn by the dotted lines in fig. 2. The nature of this apparatus is so well understood by practical chemists, and the mode of applying so obvious, as to require no further description. The retorts must, of course, be heated up to the temperatures directed, before letting in the water and oil, or fat, or tar.

The proportion between the quantity of water and the quantity of oil, or fat, or tar, let in to the apparatus while the process is going on, will vary according to the quality of the material used for producing carburetted hydrogen. If such material contains too much carbon, in proportion to its hydrogen, more water will be required to produce the ultimate compound gas, and *vice versâ.* The test of the process going on properly in the retorts *a,* and *b,* will be the inflammability of the gas, issuing at the gauge-cock A. If the gas issuing therefrom will not burn when a light is applied to it, the temperature of the retorts *a,* and *b,* must be raised till it does burn. And whether the water and oil, or fat, or tar, are supplied in the proper proportions, must be ascertained by the quality of the combustion of the gas issuing at the gauge-cock B. If that gas burns with a smoky light or other indication of the presence of too much carbon, the supply of water to the retort *a,* must be increased.

The patentee claims the method, above described, of producing hydrogen gas and oxide of carbon gas combined, freed or nearly freed from the presence of carbonic acid gas, by passing the gas, evolved by the decomposition of water, through a mass of materials, composed of charcoal, coke, or anthracite coal, and iron plates or iron wires, or lime, heated to a high temperature; and of combining such compound gas, as aforesaid, with carburetted hydrogen gas, produced by the decomposition of oil, or fat, or tar, or such other substances hereinbefore designated. And with respect to that part of the invention which relates to the apparatus employed, he claims the colanders *f, f;*—the apparatus described in reference to fig. 2, and termed a disperser; and the use of chains, for the purpose described in reference to fig. 2. With respect to the chains, he does not limit himself to any particular arrangement thereof; but he claims the use of small chains as and for the heated material on which the oil, or fat, or tar, or other such substance, hereinbefore designated, i[illegible] dropped, in the process of producing carburetted hydrog[illegible] gas;—such chains being so arranged as to expose the drops of oil, or fat, or tar, to a multitude of small surfaces, and to subdivide them minutely.—[*Inrolled in the Inrolment Office, October*, 1847.]

To Robert Fowles, *of North Shields, in the county of Northumberland, Gent., for certain improvements in propelling.*—[Sealed 8th February, 1848.]

This invention consists, firstly, in propelling vessels by means of stern propellers of a peculiar form, which the patentee terms "fan propellers;" secondly, in employing one, two, or more of such propellers, according to the degree of immersion of the vessel; and, thirdly, in so fitting and fixing these propellers that they may serve to steer as well as to propel the vessel.

In Plate IX., fig. 1, is a side elevation of the stern of a vessel, fitted with two of these propellers; and fig. 2, is a plan view of one of the propellers. *a*, is the stern-post of the vessel. *b*, is an iron shaft, placed immediately abaft and parallel to the stern-post; it turns at the lower end in a gudgeon or socket *c*, and extends upwards to the deck. *d, d*, are the propellers, which are attached by hinges to the shaft *b*; they are made of a fan-shape; and, in order that they may have a certain degree of flexibility, they are composed of a frame-work of steel rods or plates, over which a covering of vulcanized India-rubber, or metallo-thionized gutta-percha, is tightly drawn. *e*, is a shaft, placed parallel to the shaft *b*, and connected to the propellers in such manner, that when it is moved up and down it will cause the propellers to vibrate on their axes. The top of the shaft *e*, is linked to an oscillating quadrant *f*, worked by a steam-engine, placed in any convenient part of the vessel. As the shaft *b*, to which the propellers are hinged, can turn in the socket *c*, it follows that the propellers may be moved to either side of the stern-post, (which may be done by applying a tiller to the top of the shaft *b*,) and exert their propelling force on either quarter of the vessel, and thus serve also to steer the vessel without the aid of a rudder.

The above arrangement may be easily varied, so that the propellers shall be caused to vibrate in a horizontal instead of a vertical plane. For example,—the propellers may be fitted and worked in the manner represented at figs. 3, and 4; fig. 3, being a side elevation of the stern of a vessel, provided with two propellers; and fig. 4, being a plan view of one of the propellers. *g*, is an upright shaft, to which the propellers *h*, *h*, are fixed; the lower end rests in a step-piece *i*, affixed to the stern-post; and the upper end works in a suitable plummer-block or bearing. *j*, is a cross-head, firmly keyed on a shaft *g*, at right angles to the position occupied by the propellers, as shewn at fig. 4. *k*, *k*, are two connecting-rods, by which a lateral oscillating motion is communicated from a steam-engine, or a pair of engines, to the cross-head *j*, and through the shaft *g*, to the propellers: the patentee prefers that these connecting-rods should pass through apertures in the stern of the vessel; but they may be carried above deck from the shaft *g*, to the engine or engines, if preferred. For greater security, as regards the means of steering, a rudder may be inserted in a space made for it in the dead wood, as indicated by the dotted lines in fig. 3.

The patentee claims, as his invention, Firstly,—the employment, in the propelling of vessels, of propellers shaped, constructed, fitted, and worked as above described. Secondly, —the adaptation of propellers, such as above described, to the steering as well as propelling of vessels.—[*Inrolled in the Inrolment Office, August,* 1848.]

To JOSEPH MAUDSLAY, *of the firm of Maudslay, Sons, and Field, of Lambeth, in the county of Surrey, engineer, for certain improvements in obtaining and applying motive power, and in the machinery and engines employed therein.* —[Sealed 8th March, 1848.]

THE first part of this invention relates to the screw-propellers of steam-vessels, and consists in an improved mode of attaching the blades of the propeller to the shaft, whereby the propeller will open to the proper angle for propulsion the instant that the shaft is put in motion, and will return as instantly into an inoperative position when the shaft ceases to rotate.

In Plate VIII., fig. 1, exhibits part of the stern of a ship, provided with one of the improved propellers; fig. 2, is a plan view of the propeller in its expanded state; and fig. 3, is a plan view of it when closed, or in the inoperative position. *a, b,* are the blades (which may be made of any suitable form), the inner ends of which are inserted into, and are capable of turning in, sockets *c, d,* at the end of the shaft *e*; to the shank of each blade two toothed segments *f, f,* and *g, g,* are fixed, one above and the other below each socket; and the two sets of segments work into each other, so that the blades will always move together;—the extent of motion of the blades being determined by the stops *h, h.* On the shaft *e,* there is a sliding clutch *i,* which can be moved along the same, so as to catch hold of either of the sets of pins *j, j,* or *k, k,* projecting from the back of the segments *g, g.* The clutch is worked from the deck of the vessel, by means of the rod *l,* the lower end of which has a screw thread formed thereon, and works in a swivel nut *m,* attached to one arm of a bell-crank lever *n*; the other arm of which lever is forked, so as to embrace the clutch *i,* when brought down upon it.

The actions of the different parts are as follows:—Supposing the clutch *i,* to be disengaged, and the shaft *e,* to be put in motion, the blades *a, b,* will be immediately thrown into the angular position suitable for propelling, and will remain in this position as long as the shaft continues to rotate. If any cause should arise for backing the vessel, the blades are to be secured in their extended position, by interlocking the clutch *i,* with the pins *j, j.* When the shaft *e,* ceases to rotate, and the clutch is drawn back, the blades will, by the action of the water upon them, be turned round in their sockets until they come into a line with the course of the vessel; and they may be made fast in this position by interlocking the clutch with the pins *k, k.*

The second part of this invention consists in improvements in the arrangement and construction of steam-boiler furnaces, whereby a considerable saving in the consumption of fuel and of labor in the construction of the furnaces is effected.

Fig. 4, is a front view of part of a steam-boiler furnace, constructed according to this part of the invention; fig. 5, is a longitudinal section of the same; and fig. 6, is a plan view thereof. *o, o,* are the fire-bars, consisting of a series of tubes, supported by the bearings *p, p,* which permit them to revolve freely; each fire-bar has a screw-thread formed upon it from end to end, is perforated with numerous air-holes, and is open at each end; on the front end of each bar there is a worm-wheel *q,* which gears into one of the worms or screws on the shaft *r;* and this shaft being put in motion by the bevil gearing *s, t,* connected with the engine, the fire-bars are kept constantly revolving. The coals are introduced into the furnace by means of the "throttle-valve hopper" *u,* from which they drop on to the inclined plate *v,* and by it are deposited upon the front end of the fire-bars, from whence they are gradually carried to the back by the rotation of the bars. In consequence of the constant rotation of the bars, neither clinkers nor ashes can accumulate upon the same.

The patentee claims, as his invention, Firstly,—the peculiar mode of affixing the blades of propellers, at the stern of steam-vessels, to the driving-shaft before described. Secondly,—the employment, in steam-boiler furnaces, of rotating tubular screw-bars, as above described.—[*Inrolled in the Inrolment Office, September,* 1848.]

To HENRY HORNBLOWER, *late of Dalgleish-place, Commercial-road, in the county of Middlesex, but now of Devons-lane, Bromley, in the same county, engineer, for certain improvements in machinery for exerting motive power, and for raising and forcing fluids.*—[Sealed 25th January, 1848.]

THIS invention of improvements in machinery for exerting motive power, and for raising and forcing fluids, relates to that kind of engine and pump which is constructed on the rotary principle, and which is known as the rotary engine, or rotary pump.

In rotary engines, or rotary pumps, hitherto constructed, a considerable loss of power has resulted from the great amount of friction caused by the grinding of the ends of the piston or pistons against the end plates of the engine. Various plans have, from time to time, been devised for correcting this evil; but still a very large amount of friction exists in all cases where the ends of the piston or pistons, whilst rotating, are in close contact with the inner face of the stationary end plates. For, in order to keep the ends of the piston or pistons steam or water tight, it is at present found necessary to fit the end plates tightly against the ends of the piston or pistons.

To obviate the inconvenience arising from the friction of rotation between the ends of the pistons and the end plates of the engine, the patentee causes the ends of the pistons to work in guides, made in moveable discs, which may be denominated the rotary end plates, as they, in fact, act as the end plates of the engine, the ordinary end plates merely serving as covers.

In Plate IX., the invention is shewn as applied to an engine for raising or forcing water or other liquids, and also as an engine for exerting motive power, derived from the expansive force of steam, air, or gases. Fig. 1, represents a side elevation of an engine or pump, for raising or forcing water or other liquids, constructed upon the improved plan; the ordinary end plate or cover, and also the additional rotary end plate being removed, in order that the internal construction and arrangement of the parts of the engine or pump may be clearly seen. Fig. 2, is a front view of the working parts of the engine or pump, removed from the outer casing or cylinder; a detached portion of which is shewn in section at fig. 3. *a, a, a,* (figs. 1, and 3,) represent the outer casing or cylinder; *b, b,* (figs. 1, and 2,) represent an inner drum or cylinder, which carries the pistons *c, c, c.* The ends of these pistons are made to work in grooves, cut in the inner face of the rotary end plates *d, d*; one of which is shewn detached at fig. 4. The peripheries of these rotary end plates are furnished with proper packing, either hempen, leather, or metallic, as shewn in end view at fig. 2, and in section at fig. 2*, to render them steam tight. In order to force out the packing and make the end plates fit the cylinder, an annular plate *d**, is applied to the outer face of the end plates, and attached thereto by screws; by tightening which, the hempen, leather, or other packing substance will be thrust against the cylinder of the engine, and form a secure steam or water-tight packing. *e, e*, is a cam-piece or excentric, placed in the cylinder for the purpose of forcing back the pistons *c, c*, when required. This excentric or cam-piece is furnished with an adjustable stop-piece *f*, which is packed in any suitable manner, so as to form a steam or water-stop. This steam or water-stop is shewn by dots in fig. 1; but is more clearly shewn in fig. 3. The pressure of the packing or adjustable part of the steam-stop is regulated by a screw *g*. The pistons *c, c*, fit into recesses, made in the drum *b*; so that as the drum rotates and brings the pistons severally into contact with the cam-piece or excentric *e, e*, they are caused to recede into their recesses, as shewn in fig. 1. The pistons are arranged in pairs, in such a manner that they may act on one another by means of a rod *h, h*, which passes through the main or central shaft *j*, of the engine or pump; so that when one of the pistons is, by coming into contact with the cam-piece *e, e*, pressed back into its recess, the corresponding one opposite will, by the rod *h*, be forced outwards into contact with the internal surface of the cylinder or outer casing *a, a*. The peculiar construction of these pistons will be best understood by referring to the several figures 5, 6, 7, 8, and 9, which represent various views of the piston, detached from the pump or engine. At each end of the piston there are two projecting edges (as seen best in the plan view fig. 9, and in fig. 2,); which projecting edges fit into, and work in, corresponding grooves, made in the rotary end plate *d*, fig. 4. The upper edge and ends of the pistons are furnished with leather packing *i, i, i*, which forms a water or steam-tight joint, not only against the internal surface of the cylinder, but also against the rotary end plates *d, d*. The pistons for a pump or for an engine that is required to work in only one direction are furnished with ears *k, k*, for the purpose of assisting them in their inward motion, when they come against the cam-piece *e*, as seen in fig. 1. In engines which are required to work in both directions, the pistons should have an ear on each side, as shewn in figs. 10, and 11, which represent an engine for exerting motive power. The inner or under side of the pistons is furnished with a flat spring *l*; by means of which they are kept constantly up to their work, and yet have a sufficient degree of elasticity to allow them to work with facility, and without creating an injurious amount of friction.

Fig. 5, represents a side elevation of one of the pistons, with its spring *l*, attached; fig. 6, is a side elevation, with one of the side plates of the piston removed, and shewing the arrangement of the packing; fig. 7, is a longitudinal vertical section; fig. 8, is a view of the opposite side of the piston to that shewn at fig. 5, and shewing ears *k*, *k*, on this side also, as would be the case for a steam-engine; and fig. 9, is a plan view, shewing ears on both sides, and the packing in the centre.

Fig. 10, is a side elevation of a rotary engine, to be worked by steam or other elastic vapour, and constructed according to this invention; the end plate or cover being removed, in order that the internal construction may be more clearly seen. Fig. 11, is a vertical section of the same, taken through the centre of the engine and steam-ways. The engine is similar in construction to the pump already described, with the exception that the steam-ways are not so large as the ports for admitting water into the interior of the engine, shewn at fig. 1; and as steam-engines are frequently required to work in either direction, suitable provision must be made for allowing them to do so. The cam-piece or excentric *e*, *e*, is therefore somewhat different in construction to that already described, both ends of it being inclined, in order to admit of the pistons moving in either direction; and the pistons, in this instance, are furnished with ears *k*, *k*, on each side. The steam or other elastic vapour is admitted into the engine by the pipe *m*; and after passing through the engine, and exerting its elastic force on the piston *c*, *c*, it escapes through the pipe *n*. The direction of the engine may, however, be instantly reversed, by turning the cock *o*, so as to let the steam into the engine on the opposite side.

As all the other parts of the engine are similar to those in the pump, above described, and as similar letters of reference are placed on corresponding parts in all the figures, it will not be necessary to give any further or more detailed explanation thereof.

The patentee claims, First,—the application to machinery for exerting motive power, and for raising and forcing fluids, of moveable or rotary end plates, which revolve with the pistons, and form guides, against which the ends of the pistons work; while, at the same time, they securely close up the ends of the casing of the engine, and, with the casing, form the chamber, into which the steam, water, or other fluid, enters. Secondly,—constructing the pistons in the manner herein shewn and described, whereby their action is rendered more smooth, easy, and certain.—[*Inrolled in the Petty Bag Office, July,* 1848.]

To William Tottie, *of Crosby-square, Bishopsgate-street, in the city of London, merchant, for improvements in distilling,—being a communication.*—[Sealed 14th February, 1848.]

This invention relates to the purification of spirits produced by distillation, and consists in causing the spirit to pass from the still through layers of charcoal, or purifying matter, (in suitable compartments, cooled by water,) until the spirit is thoroughly purified.

A vertical section of the apparatus employed by the patentee is exhibited in Plate IX. *a*, is a vessel, containing four beds *b*, *b*, of wood charcoal, or animal charcoal, or other purifying matter. *c*, *c*, are perforated shelves, on each of which the charcoal (broken in small pieces) is deposited, and upon the charcoal is placed a cover *d*; this cover does not touch the side of the vessel *a*, all round, but has parts cut away at intervals to allow the vapours to ascend into the space beneath the next shelf, *c*.

Each of the compartments containing the charcoal is surrounded by a vessel *e*, which is supplied with water by the pipe *f*, provided with a cock. *g*, is an overflow pipe, for carrying off the water; and *h*, is a short pipe, which is kept plugged when the apparatus is at work, but is opened when the vessel *e*, requires cleansing. *i*, is a compartment containing sponge, through which the alcoholic vapours ascend, and then pass through a pipe *j*, into a suitable refrigerator. The apparatus is to be placed on the top of the still; but it may be placed on one side, if more convenient.

The raw spirit, being introduced into the still, is evaporated by steam; and the vapours ascend into the first compartment, and heat it. Water being now allowed to flow into and from the vessel *e*, the attendant will be thereby enabled to regulate the temperature of the charcoal so as to cause the oil to be retained, and yet allow the alcoholic vapours to ascend through the next bed of charcoal, which is cooled in like manner. The vapour or spirit ascends through all the beds of charcoal in succession, and then passes off, in a purified state, to the refrigerator, through the pipe *j*, as before stated.

The patentee claims the arrangement of apparatus, consisting of compartments of charcoal, or purifying matter, each with its cooling vessel, as above explained; whereby the alcoholic vapours may, in their passage to the refrigerator, be caused to pass successively through such compartments.—[*Inrolled in the Inrolment Office, August,* 1848.]

To JAMES TIMMINS CHANCE, *and* EDWARD CHANCE, *of Birmingham, glass manufacturers, for improvements in furnaces, and in the manufacture of glass.*—[Sealed 14th February, 1848.]

THIS invention consists, firstly, in an improved mode of constructing reverberatory furnaces. In the ordinary reverberatory furnaces, the heat, after passing from the fire through the furnace, and being reverberated by the arch, proceeds through a flue to the chimney; so that when the heat has passed through the furnace, it is no longer used for heating the same. Now this part of the invention consists in so constructing reverberatory furnaces, that the heat, after having passed through the body of the furnace, shall, by means of a flue or flues, carried over the arch, aid in heating the arch.

In Plate IX., fig. 1, is a longitudinal section of a reverberatory furnace of the improved construction; and fig. 2, is a transverse vertical section of the same. The heat, in passing through the body *a*, of the furnace, is reverberated by the arch *b*; then it passes back over the arch *b*, and under the arch *c*; and thence it proceeds through a flue to the chimney.

The second part of the invention consists in a mode of transferring plates of glass (particularly large thin plates) into the annealing oven or kiln. The ordinary practice has been, to push the plate, when sufficiently hard, into the oven or kiln; but this mode of working renders it necessary that the glass should have lost a considerable portion of its heat in becoming sufficiently hard to allow of such pushing. The patentees' improved mode of operating consists in drawing the plates into the annealing oven or kiln, instead of pushing them. For this purpose, an opening or openings is or are made in the annealing oven or kiln; so that, by introducing tongs or other suitable instruments through such hole or holes, the workman can take hold of a plate of glass and draw it into the oven or kiln; and this may be done in cases where the plates of glass would be bent or injured if pushed into the oven or kiln.

The instrument which the patentees prefer to use for drawing the plates of glass is shewn at figs. 3, 4, and 5;—fig. 3, being a side view, and figs. 4, and 5, end views thereof. *d*, is a shaft or spindle, supported by bearings *e*, *e*, affixed to the bar *f*; at one end a block of wood *g*, is fastened; and at the other end there is a handle *h*, by which the shaft can be turned—there is also a handle *i*, fixed to one of the bearings *e*, by which the workman draws the bar *f*. In using this instrument, the workman first places the end *f**, of the bar *f*, under the glass (which is marked *j*, in figs. 3, and 4); he then turns the handle *h*, and so causes the block of wood *g*, to press on the glass; then, by catching hold of the handles *h*, *i*, he draws the glass into the annealing oven or kiln.

The patentees claim, Firstly,—the mode of constructing reverberatory furnaces, above described. Secondly,—the moving of plates of glass into an annealing furnace by drawing in place of pushing, as above explained.—[*Inrolled in the Inrolment Office, August*, 1848.]

To WILLIAM SANGSTER, *of Regent-street, in the county of Middlesex, umbrella and parasol manufacturer, for improvements in umbrellas and parasols.*—[Sealed 8th February, 1848.]

THE first part of this invention consists in the use of fabrics composed, more or less, of alpaca or other wool or mohair for covering the frames of umbrellas and parasols.

The patentee prefers to use fabrics made by weaving with cotton warp and alpaca or other wool or mohair weft; and he burns or singes off the projecting fibres on the surfaces of such fabrics. The fabrics should be woven close, and should be composed of fine warp and weft: the fabrics which the patentee has already used consist of about eighty cotton warps to an inch, and about one hundred and ten wefts to an inch; and he prefers to weave them with stripes or other ornamental borders, formed by the use of silk warp. To prevent waste in cutting out the fabrics, they should be woven in widths of twenty-two, twenty-four, and twenty-six inches, which correspond with the widths of the fabrics heretofore used in making umbrellas; and for parasols the fabrics are made sixteen, eighteen, and thirty-eight inches wide. The fabrics are to be cut up, formed into covers, and applied to the umbrella and parasol frames in the usual manner.

The second part of this invention relates to an improvement in the manufacture of that class of parasols in which linings of a different color to the external covering fabric are used. In making such parasols, it has been the practice to apply the linings by hand; instead of which the patentee causes the fabric that is to be used for the lining and the fabric for the external cover to adhere together; and he uses this compound fabric for making parasols in the same manner as when a single fabric is used. The two fabrics are made to adhere together by means of India-rubber or other flexible cement, in the same way as the waterproof fabrics, termed Mackintosh cloths, are made; but it is not essential that the cement should be waterproof, so long as it is sufficiently flexible.

The patentee claims, Firstly,—the manufacture of umbrellas and parasols by combining fabrics, consisting more or less of alpaca or other wool or mohair, with suitable frames for umbrellas or parasols. Secondly,—the manufacture of lined parasols by first causing two fabrics, of different colors, to be cemented together, and then forming them into covers and combining them with suitable parasol frames.—[*Inrolled in the Inrolment Office, August,* 1848.]

To FRANCIS WHISHAW, *of Hampstead, in the county of Middlesex, civil engineer, for a certain manufacture of pipes of earthenware, pottery, and glass, and of certain applications and arrangements thereof.*—[Sealed 8th March, 1848.]

THIS invention has for its object to produce pipes of any convenient form, and suitable for the reception of the wires of electric telegraphs in a state of insulation, and for other purposes, wherein a number of separate pipes or channels may be required, or wherein pipes of earthenware or pottery, of great uniformity of structure, and certain combinations of pipes of those materials and of glass, may be employed with advantage. It consists, firstly, in the formation of any required number of pipes, channels, or ducts, within one and the same mass or external surface of earthenware or pottery; the shape and arrangement of such pipes, channels, or ducts, and the form of the external surface, being adapted to the required circumstances. Secondly, in the mode of manufacturing pipes of earthenware or pottery, where pipes of peculiar uniformity of surface and consistency of material are required, whether as a cluster of pipes, channels, or ducts, within the same mass, or to be employed singly in the usual manner.

Thirdly, in certain combinations and arrangements of pipes of earthenware, pottery, and glass. Fourthly, in a certain mode of combining pipes of earthenware, pottery, and glass, so as to render them air-tight at the junctions.

The formation of any required number of pipes, channels, or ducts, in the same mass of material, so as to be adapted for the insulation of the wires of an electric telegraph and other purposes, may be effected in various ways. The patentee manufactures these pipes or clusters of pipes in lengths of about two or three feet, and unites them in the manner hereafter described. Pipes of this description may be formed of almost any clay or material used in the manufacture of pottery or tiles; but the patentee prefers the ordinary Dorsetshire and Devonshire clay, or material used in stone pottery, to which crushed or powdered pottery-ware may be advantageously added. The apparatus employed for the manufacture of such pipes consists of an open cylinder or box, suitably mounted on standards, to contain the mixed clay or material for forming the pipes, and having a plate, which acts as a piston, to press the clay through a suitably formed die (known in the trade as a "dod"), fixed at one end of the cylinder. The clay, being formed into the required shape by pressure through the dod or die, is allowed to dry, and the subsequent processes at present in use for the manufacture of earthenware pipes are proceeded with until the length of pipe is completed. The lengths of pipe may be united, as at present, by means of a socket-joint, formed at one end of the length to receive the reverse end of another length (the space around this end being filled with cement); or the lengths may be united by another kind of joint, hereafter described; or by any other description of joint that may be preferred. The fitting of the several lengths, in such a manner as to bring the cavities or internal pipes together with the required accuracy, is secured by forming, in the manufacture thereof, a slight register line or mark outside the pipe or external covering, which serves as a guide to the workman in putting the lengths of pipe together.

In order to form curved pipes or junctions, intended to unite two pipes extending in different directions, the patentee employs plaster moulds, such as are commonly used for making curved pipes, and manufactures the pipes in the ordinary way, except that curved rods have to be fixed in gauge-plates, or other suitable contrivances, at each end of the mould, for the purpose of forming the cavities or internal pipes, corresponding with those made in the straight pipe, of which the required curved pipe is to form the continuation. These curved pipes, when formed, are united to the straight pipes while the material is soft, in the same manner as is usual in the manufacture of ordinary earthenware pipes. The curved or junction-pipes may also be formed by cutting up a straight pipe in such a manner that when placed in a curved mould, and bent to its shape, the pieces might be joined together, and form a curved pipe.

In Plate IX., fig. 1, is a sectional elevation of the apparatus for making the pipes; fig. 2, is a plan view, and fig. 3, a vertical section of the dod or die; fig. 4, represents a section of the pipe produced thereby; and figs. 5, and 6, represent some other forms of pipe, which it may sometimes be desirable to manufacture. *a, a,* are the ordinary standards of the machine. *b,* is the cylinder that contains the clay to be worked into pipes; it is mounted on an axis *c,* turning in bearings *d, d,* affixed to the standards *a*; and it is capable of being turned down, to receive a fresh charge of clay when required. *e,* is the plate, which acts as a piston, and is caused to move within the cylinder by turning the screw *f.* *g,* is the dod or die, resting upon a ring or rim, formed at the bottom of the cylinder *b*; the plate of the dod forms a bottom to the cylinder, and prevents the clay from passing out, except through the elongated aperture or mouth formed in it at *h*; and this plate is furnished with carrying-pieces *k,* to which iron rods *i,* are attached, to act as cores for forming the internal cavities or channels in the clay, as it is forced through the mouth of the dod by the descent of the piston. *l,* is a sliding-table or rest, on which the lower end of the length of pipe *j,* is received, as it emerges from the dod.

The dod or die, above described, consists of a plate, with only one elongated aperture or mouth, and set of rods or cores; but, in order to accelerate the manufacture of these pipes, the patentee uses a dod with two or more apertures and sets of rods,—thereby forming two or more lengths at a time. Other modes of pressing or forcing the clay through the dod may also be employed.

The pipes made by the above apparatus are dried, and afterwards straightened on the outside by means of the ordinary straightening box, made of wood or plaster of Paris, and in halves;—the internal channels being cleared, if necessary, by passing through them a rod, with a piece of leather or other suitable material at the end. The internal channels in the curved pipes may be cleared by drawing curved rods or pieces of flexible material, as cane, gutta-percha, &c., through them. The lengths of pipe thus straightened have the socket or other joint formed upon them, and are afterwards hardened by exposure to heat, as usual;—the common modes of glazing both the internal and external surface being employed. Lastly, these lengths of pipe are united together in the ordinary manner; the workman taking care to follow the register mark on the outside.

Although the above description is confined to the manufacture of earthenware pipes of a circular form on the exterior, the patentee does not intend to confine himself to such form, as by varying the form of the shaping part of the dod, a corresponding variety of form may be given to the exterior of the pipe; and by varying the form and disposition of the cores *i*, a corresponding variety may be produced in the internal formation of the pipes. Also, by the above mode of manufacture, pipes may be produced suitable for various purposes, combined as well as separate; for instance, a supply and waste water-pipe may be combined in one pipe—also pipes of different diameters and different forms may be combined.

The patentee next proceeds to describe the second part of his invention, which consists in the manufacture of a cluster of pipes, already described, or of single pipes, by means of a conical dod or die. Fig. 7, is a plan view, and fig. 8, a vertical section of the improved dod for manufacturing single pipes;—the improved dod for making clusters of pipes having been already described and represented at figs. 2, and 3.

The advantage which this dod possesses over that in ordinary use consists simply in its affording a longer space for the clay to pass through in forming the pipe; thereby avoiding the liability to crack, which is occasioned sometimes by the division of the particles of the clay in its passage over the bridge or support for the core *i*. The clay is, by means of this improved dod, pressed firmly and compactly together, before it leaves the aperture or mouth of the dod in the shape of a manufactured length of pipe.

The third part of the invention consists in the production of certain combinations of pipes of earthenware, pottery, and glass, as follows:—The patentee combines lengths of clusters of pipes together by any of the modes already described; or, instead of employing such clusters, he combines separate pipes by means of a collar of a cluster of pipes (cementing such separate pipes into the collars); and he also employs pipes of earthenware or pottery of the ordinary construction, in combination with internal plugs of a cluster of pipes of short lengths,—such pipes and plugs being held together by external collars, cemented in the usual manner. In the combination last described, the plugs serve as the insulators of the wires; but it will be obvious that, as the derangement of any one wire might destroy the insulation of the others, this mode is not so secure as that firstly described. Fig. 9, is a section, shewing the junction of two lengths of earthenware pipes, with a plug *m*, fixed therein, through which the glass pipes *n*, are inserted: these plugs may be made of earthenware, pottery, glass, or other material; but, for this combination, the patentee prefers plugs of gutta-percha. Fig. 10, exhibits the junction of two similar lengths of glass pipes,—the plug, in this case, is fixed in its place while in a heated state; the ends of the glass pipes being also heated, and united by a cement, known as "electrical cement," or that which is used in the manufacture of glass electrical apparatus. *o*, is a glass collar, that covers the junction of the pipes; it is fixed in its place by means of two chases or grooved rings, formed on its inner surface, corresponding with two similar grooved rings on the outer surface of the pipes, into which grooved rings electrical or other cement (such as marine glue) is introduced, and the joint is thus rendered secure. The arrangement shewn at fig. 10, may also be used without the pipes *n*;—the perforations or passages in the plug serving as insulating supports for the telegraphic wires. The patentee remarks, that when it is desired to use earthenware or pottery pipes, with a series of internal perforated plugs, or plugs of a cluster of pipes, instead of the separate pipes or channels before described, such plugs may be fixed within the lengths of pipe, manufactured in the ordinary way, while the material is soft, in the same manner as joints are now added to pipes by means of softened clay, or material known in the trade as "slip" or "booting clay."

The fourth part of the invention consists in a mode of combining pipes of earthenware, pottery, and glass, so as to render them air-tight at the junctions. Fig. 11, is a vertical section, and fig. 12, a plan view, of the ends of two pipes *p*, *q*, shaped and brought together as shewn, and united by means of liquid or semi-liquid cement, poured into the cavity *r*, and filling the grooved ring *s*, formed in halves in the ends of the pipes *p*, *q*,—a cement, formed of asphalte or gutta-percha, is well adapted for the purpose. The joint thus formed will prevent the passage of air, gas, or other fluid, out of the main pipe. If preferred, the grooved ring may be made of any other form in the transverse section (as, for example, the dovetail form represented at fig. 13.) Glass pipes may be connected by an air-tight joint, formed in the manner shewn at fig. 10, by making grooved rings in the collar *o*, and upon the ends of the pipes, and introducing cement into the same. Pipes connected by these air-tight joints will be suitable for every variety of speaking telegraph, hydraulic telegraph, and for gas and water pipes, and for other uses requiring an air-tight pipe or communication.

The patentee claims, as his invention, Firstly,—a cluster of pipes, channels, or ducts of earthenware or pottery, combined together in the same mass, or within the same external surface, as above described. Secondly,—the manufacture of pipes of earthenware or pottery by means of a conical die or dod, as above described. Thirdly,—the manufacture, combination, and arrangement of pipes of earthenware, pottery, or glass, with suitable collars and plugs, as above described. Fourthly,—the combining pipes of earthenware, pottery, and glass, by means of air-tight joints, constructed and arranged as above described.—[*Inrolled in the Rolls Chapel Office, September,* 1848.]

To JOHN WATSON, *merchant, and* EDWARD CART, *Gent., both of Hull, for improvements in the manufacture of gas.*—[Sealed 14th February, 1848.]

THE object of this invention is to combine apparatus with an ordinary hot-air stove, for generating gas in proportion to the supply required; which is effected by so arranging the parts of the apparatus, that the supply of material (from which the gas is to be generated) to the retort will be gradually cut off as the gas-holder becomes filled; so that if the supply of gas be not consumed, the retort will not be fed with the material from which it is to be produced, and the generation of gas will consequently cease.

In Plate VIII., a sectional elevation of the apparatus employed by the patentees is exhibited. *a,* is an ordinary hot-air stove, with a retort *b,* set therein,—the retort may be set in brickwork or masonry instead of the iron stove; *c,* is a feed-pipe, that conducts the liquid, from which the gas is to be manufactured, from the reservoir *d,* to the retort; *e,* is a cock, upon the feed-pipe, which is opened at the commencement of the operation of making gas, and is closed when the production of gas is no longer desired; and *f,* is a self-acting cock, provided with a long handle or lever *g,* connected by the rod *h,* with the top of the gas-holder *i.* When the production of gas exceeds the consumption, the gas-holder will rise and close the opening through the cock *f,* to a corresponding extent, so as to reduce the supply of liquid to the retort; and when the consumption of gas exceeds the production, the gas-holder will fall, and, by opening the cock *f,* to a greater extent, cause an increased supply of liquid to enter the retort: by this means, the amount of gas produced will be regulated by the quantity consumed. The gas passes from the retort into the vessel *j,* from which it is conducted, by the pipe *k*, into the washer or purifier, and from thence it ascends through the worm-pipe *l*, fixed in a cylindrical vessel *m*, nearly filled with cold water; the upper end of the pipe *l*, is bent, and dips into the water in the vessel *m*; and the gas, as it passes therefrom, rises through the water into the gas-holder *i*, the lower edge of which dips into the water in the tank *n*, that surrounds the vessel *m*.—*o*, is the pipe which conveys the gas to the burners.

The heat used in generating the gas may be applied to the ordinary purpose of heating air, in addition to generating gas, or it may be applied to other uses. Although the patentees believe the above apparatus to be the best that can be used for carrying out the invention, yet the details may be varied, so long as the peculiar character of the invention be retained.

The patentees claim, as their invention, the combining of parts into a self-acting gas apparatus, as above described.—[*Inrolled in the Inrolment Office, August,* 1848.]

To Frederick William Michael Collins *and* Alfred Reynolds, *both of Charter-house-square, in the county of Middlesex, engravers and printers, for improvements in the art of ornamenting china, earthenware, and glass.*—[Sealed 14th March, 1848.]

This invention consists, firstly, in preparing pottery or transfer paper, by covering it with the size hereafter described, and passing it between rollers to make the sized surface smooth, for the purpose of transferring patterns, subjects, devices, or designs, composed of two or more colors, on to china, earthenware, and glass; secondly, in printing or obtaining patterns or devices (which are, when finished on the surface of the tile or other object to be ornamented, to be of two or more colors) on the sized surface of such prepared or ordinary sized paper, either by hand-drawing, or by means of separate blocks, plates, or pieces, one for each color,—such blocks, plates, or pieces, to be covered either with the required colored inks, or with suitable varnish, rolled on in the usual way, for the purpose of being transferred to china, earthenware, or glass; thirdly, in various modes of transferring the patterns or devices (of two or more colors) on to china, earthenware, or glass, from one piece of transfer-paper.

The new transfer-paper is made by taking the ordinary pottery tissue-paper, now used for transferring, and brushing it over two or three times with a thin size, made by dissolving six parts, by weight, of French starch, two parts of gum-arabic, and one part of alum, in hot soft water; each coating is allowed to become quite dry before the next is put on; and when the last coat is dry, the paper is milled with a strong pressure between two smooth rollers, in order to give it a firm and even surface.

On the prepared paper a pattern or device, of two or more colors, is printed or obtained, by hand-drawing, or in various ways from flat surfaces, yielding a full body of color or suitable varnish. To illustrate this part of the invention, the patentees describe the mode of obtaining the required pattern by printing from wooden blocks, on which the various parts of the pattern have been drawn and cut;—the transfer-paper used being of the new kind.

In Plate VII., fig. 1, exhibits a pattern for an ornamental tile, consisting of three colors, blue, red, and yellow, for which three blocks would be required; viz., A, fig. 2, for the blue; B, fig. 3, for the red; and C, fig. 4, for the yellow. If this pattern is to be transferred on to a china or earthenware tile, while in a state of biscuit, the following is the mode of proceeding:—The blue color is first printed from the block A, on to the sized surface of the transfer-paper, then the red color from the block B, and lastly the yellow color from the block C; and while the colors are yet wet on the paper, they are transferred, in the ordinary way, on to the biscuit tile, by turning the printed side of the paper down upon it, and pressing the paper gently: when the colors have dried on the tile, the transfer-paper is damped and removed; and then the tile will be ready for the hardening or drying-kiln, and can afterwards be glazed and fired. If it be required to transfer the same pattern, while the colors are wet, from the transfer-paper on to glazed china or earthenware, or on to glass, the surface of the article, over which the pattern is to extend, must be coated with ordinary varnish, in the usual way; and when this coating is dry, the transfer-paper is to be turned over upon it;—after the colors have become dry, the transfer-paper is removed by damping.

Another way of dealing with the piece of transfer-paper, when the three colors have been printed upon it, is to allow the colors to dry, then to coat the tile with the varnish, and when it is nearly dry, or tacky, to turn the transfer-paper down upon it (rubbing the latter gently on the back); and, after the varnish has become dry, the paper is to be removed by damping it. Or, when the colors on the transfer-paper are dry, a coating of varnish may be lightly brushed over them, and when it becomes tacky the paper may be turned down upon the tile; after the varnish is dry the paper may be removed by damping, and the colors will be found adhering to the tile, and in a fit state to be burnt in; which latter process causes the varnish to volatilize and disappear.

Another method of producing and transferring the pattern is, instead of rolling colored inks on to the blocks, to roll oil or varnish on to the block A, and, after having printed that upon the new transfer-paper, to dust on the blue color in powder (wiping off the surplus color), and allow the oil or varnish to dry; then the block B, is to be printed from, in a similar manner, and the red color applied in powder; after this the block C, is to be printed from, and the yellow color applied; and when the three colors are quite dry, they are to be transferred in the manner above described for transferring colored inks or liquid colors, when they have been allowed to dry on the prepared transfer-paper.

Three blocks of stone or three sheets of zinc (prepared to receive the color, as in the ordinary processes of lithographic and zincographic printing), or other suitable flat surfaces, may be substituted for the three wooden blocks; or any combination of such surfaces may be used to print the various colors, in a regular series, on the prepared transfer-paper; or ordinary sized pottery transfer-paper may be used instead of the new transfer-paper,—the tile or other article to be ornamented being varnished in the usual way.

The patentees claim, Firstly,—the application of what is commonly called the pottery or transfer-paper, prepared by covering it with the size above described, and then passing it through rollers to make the sized surface smooth, for the purpose of transferring patterns, subjects, devices, or designs, composed of two or more colors, on to china, earthenware, and glass, in order to ornament the same. Secondly,—the printing, placing, or obtaining of patterns, subjects, devices, or designs (which are, when transferred to and finished on the tile or other object to be ornamented, to be of two or more colors) on the sized surface of such prepared or ordinary sized paper, either by hand-drawing, or by means of separate blocks, plates, or pieces, one for each different color; such blocks, plates, or pieces, to be covered either with the required colored inks or with suitable varnish, as the case may be, rolled on in the usual way, for the purpose of being transferred to china, earthenware, or glass. Thirdly,—the transferring, in the various manners aforesaid, of the patterns, subjects, devices, or designs, of two or more colors, so printed, placed, or obtained, to china, earthenware, or glass, from one piece of transfer-paper.—[*Inrolled in the Inrolment Office, September,* 1848.]

To HENRY VINT, *of St. Mary's Lodge, Colchester, in the county of Essex, Gent., for his invention of improvements in propelling ships and other vessels.*—[Sealed 6th September, 1847.]

THESE improvements in propelling ships and other vessels consist in enclosing the paddle-wheels (of whatever construction) in close chambers, on or in the sides of the vessel, with suitable shields on the outside of those chambers, formed by casings and curved guards; the whole of the propelling-wheels, and the principal parts of the casings, being intended to be submerged or placed below the level of the water-line.

In Plate VII., fig. 1, represents a transverse section of the vessel, with a pair of paddle-wheels *a*, *a*, attached; which wheels are to be worked by a steam-engine or other motive power machine within: these paddle-wheels, it will be seen, are partially enclosed by the casings *b, b*. Fig, 2, is a horizontal section of the vessel, taken about the level of the axles of the propelling-wheel, shewing the extent along the ship's side and figure of the curved guards *c, c, c*, formed by a continuation of the casing. Fig. 3, represents a longitudinal elevation of the side of the ship, shewing how much of the propelling-wheel is proposed to be enclosed within the casing.

It will be seen that the lower part of the propelling-wheel acts freely in the current of water in which the vessel floats, whilst the remaining parts of the wheel are revolving in the cylindrical chamber occupied with dead water; the chamber being open to the free access of the water only at the under part. It may be necessary to make, in the upper part of this cylindrical chamber, a valve or opening *d*, for the purpose of allowing any air within the chamber to escape. The guards *c, c*, which extend along the sides of the vessel from the box or recess of the paddles, are made of wood or other suitable material; and they may be either solid or hollow. They may be shaped in the curved form shewn in the drawing, or in some such curved figure, dependent upon the external form of the vessel; the particular feature to be observed in their construction being that they should present as little resistance as possible in passing through the water. Instead of allowing the whole of the paddle-wheel to project from the sides of the vessel, the patentee proposes, in some cases, to construct the vessel in such a manner as to admit of placing the wheel either wholly or partially within the lines of the side of the vessel; a recess being made on each side for this purpose.

The patentee remarks that he does not confine himself to any particular form or construction of paddle-wheels, nor to the means of driving them, as various forms or constructions of paddles or propelling arms may be adapted, and driving powers employed, in conjunction with his improvements; but he claims the mode, above described, of partially enclosing submerged propellers in cylindrical casings at the sides, or in recesses built in the sides, of the vessel; the lower portions of the propellers being thereby alone enabled to act effectively in propelling the vessel onward through the current of water in which she floats; the tail-water being allowed to escape freely from the successive strokes of the propellers, and the inoperative portions of the propellers, at the same time, being enabled (though submerged) to move round in dead water. He also claims the curved forms of the guards, applied to the sides of the vessel, as above described, for the purpose of protecting the paddles, strengthening the vessel, and assisting its buoyancy.—[*Inrolled in the Petty Bag Office, March,* 1848.]

To George Benjamin Thorneycroft, *of Wolverhampton, iron-master, for improvements in the manufacture of rails for railroads.*—[Sealed 27th May, 1847.]

The patentee commences his specification by stating that railway-bars or rails, manufactured in the ordinary manner from piled or fagotted iron, are liable to split in the pile or laminate, which causes them to wear away very fast; to prevent this is the object of the present invention, which consists in forming the wearing part of the rail of a piece of iron of one homogeneous substance, without piling or fagotting in any way.

The patentee takes pig or refined metal of the best quality, and after puddling it in the most perfect manner, he makes one ball of sufficient weight to form the slab or bloom required for the wearing part of the rail; or, if more convenient, he combines two or more puddled balls together (by means of a hammer, squeezer, compresser, or other suitable machine), while the iron is in a molten state, and before any part of it has been operated upon, to make it solid or nearly solid, so that a perfect union may take place. The proper weight of iron having been thus obtained in one perfect mass, it is not to be subjected to the process of working down, and piling, and working down again in rolls or by hammers, as hitherto practised, to render the iron sufficiently ductile to be rolled into a rail without cracking; but the requisite degree of ductility is obtained by compressing the iron sufficiently to make its specific gravity about the same as when piled and re-rolled into No. 2, or No. 3, bar-iron, which is what is generally used on the outer surface of the pile or fagot for making rails. Various modes of compressing the iron in one body, to obtain the required ductility, may be adopted; but the patentee does not confine himself to any particular mode of accomplishing it, so that the unpiled iron is obtained sufficiently ductile to bear being rolled or drawn into perfect rails.

The patentee, after describing the above method of making what he calls his antilaminating rails from puddled iron, describes the following mode of accomplishing the same object with charcoal iron:—He takes pig or refined iron, and makes it malleable in the charcoal refinery, bringing it out in one lump of sufficient weight to make the slab or bloom which is to form the wearing part of the rail. If it be desired to use scrap or other malleable iron for this purpose, it is to be melted down into one mass in the charcoal refinery, and compressed by hammering or otherwise, until it is sufficiently ductile to bear rolling or drawing into the rail.

The patentee states that he uses No. 1, or No. 2, iron for the back or under part of the rails; and he describes the following as the most simple means of making rails according to his invention; but he does not confine himself to any particular mode, so long as the antilaminating iron is placed on the wearing part of the rails:—In figs. 1, 2, and 3, Plate VIII., *a*, indicates the slab of antilaminating iron, which must always be so rolled, in making the rail, as to be upon the wearing part thereof; the back or under part *b*, may be made of bars of No. 1, 2, or 3, iron, box-piled, (as at fig. 1,) or rolled in the usual way, (as at fig. 2,) or it may consist of a slab of iron, made from scrap, as at fig. 3. Fig. 4, is a transverse section of a bridge-rail, made in the ordinary manner; and fig. 5, is a section of a bridge-rail, made according to this invention. If rails of other sections are required to be double-headed, so as to admit of being turned, in order that both sides or edges may be subjected to wear, then an antilaminating slab must be used on both sides, as shewn at fig. 6, or the rail must be formed of two slabs of antilaminating iron only.

The patentee states that his object is to keep the wearing part of the rail of crystallized and not of fibrous iron, as the latter wears much softer than the former; and for this reason he wishes to get that part of the rail which will not be acted upon by the wheels, of fibrous iron, which is not so liable to break as the crystallized iron; therefore, when the two kinds are combined, the one will assist the other. In preparing the puddled iron, small scraps may be mixed with the new iron in the puddling process, which will render the iron more ductile; but when the quality of the iron is sufficiently good, the scraps may be dispensed with, and the iron will be better without them, because the scraps, being fibrous, are much softer than the new crystallized iron, and may cause the surface of the rail to wear unevenly.

The patentee claims, as his invention, the making of railway-bars of homogeneous iron in the wearing parts of the rail, or altogether, or in such proportions as may be desirable for the greater durability of the rail.—[*Inrolled in the Inrolment Office, November,* 1847.]

To William Jeary Cannon, *of Cambridge, in the county of Cambridge, solicitor, for improvements in the construction of carriages for the conveyance of sheep and other animals on railways.*—[Sealed 10th February, 1848.]

The object of this invention is to collect the dung and urine voided by animals whilst being conveyed from one place to another upon a railway; which object the patentee effects by constructing new trucks or carriages in a manner suitable for this purpose, or by applying tanks, &c., to the trucks or carriages at present in use, as hereafter described.

The improvement in the construction of new cattle-trucks consists in the introduction of an open floor of transverse bars, slightly reeded or ridged (so as to secure a sure footing for the cattle), made of galvanized cast-iron or other metal or wood; beneath the floor a vessel or tank is attached to the bottom of the carriage to receive the dung and urine that passes through the floor; and this tank is provided with a tap, cock, or sluice, by which the contents are drawn off at the end of the journey, and they are then deposited in a suitable reservoir provided for that purpose. The ordinary cattle-trucks or carriages are rendered suitable for the purpose of this invention by the application of an open floor, of the same construction as that just described, above the usual floor of the carriage; which latter floor is to be lined with sheets of galvanized iron, or other incorrodible metal, extending about two or three inches up the sides, so as to form a reservoir or tank for the reception of the urine and dung; and this tank is to be provided with a tap, cock, or sluice, as above mentioned. The patentee recommends that the cattle-trucks should be divided into compartments, each suitable for containing one animal.

With regard to sheep and swine trucks, the flooring of the trucks at present in use must be lined or covered with sheets of galvanized iron, or other suitable metal or material, and a great number of small holes drilled through the flooring for the passage of the urine into a tank fixed beneath the same; which tank must be furnished with a tap, cock, or sluice, for drawing off the manure. In new trucks, the flooring should be either made of wood, covered with thin sheets of galvanized iron, or formed of sheets or plates of galvanized iron, sufficiently thick and strong to sustain the pressure to which they would be subjected, without any woodwork. — [*Inrolled in the Inrolment Office, August,* 1848.]

To JOHN SCOFFERN, *of Upper Holloway, M. B., for improvements in the manufacture and refining of sugar.*—[Sealed 8th December, 1848.]

THIS invention consists in the use of sulphurous acid for extracting lead which has been employed for purifying solutions containing sugar. The patentee says, that it has been before proposed to use salts of lead for purifying or extracting coloring and other matters in the manufacture and refining of sugar, but hitherto without success, because no practically useful means of separating the lead from the purified solution of sugar had been devised. He describes the application of his invention, firstly, to the refining of sugar, and, secondly, to the process of manufacturing sugar from the juice of the cane, beet-root, and similar matters.

The mode of applying this invention to the process of refining is as follows :—The quantity of sugar to be operated upon is put into the blow-up pan, and dissolved in the ordinary way, but without the usual addition of lime-water and blood; and then the patentee adds the "lead material," prepared as hereafter explained; such lead material having been first rubbed up with enough hot water or syrup to bring it to a thin pasty state. The patentee says, that the exact amount of the lead material which is to be added can only be determined by experience, and therefore he can only give general directions for its use. Supposing the sugar to be an average refining sample of Jamaica produce, the manufacturer should commence operations by adding forty grains of the lead material to each pound of sugar,—less pure sugar requiring more of the lead material. By proceeding thus, he should obtain a good result; and the information he acquires by this operation will be a sort of standard for the future. A portion of the sugar thus operated upon should be set apart for future reference, until the eye of the manufacturer shall have become sufficiently trained to determine the amount of lead material required to separate the impurities of any particular description of sugar.

When the lead material has been added, the liquid is heated to 180° Fahr.; and after the sugar has been perfectly dissolved, and the lead material well incorporated, the application of this heat, during the space of five minutes, will produce the effect desired. The contents of the vessel should now be allowed to repose for fifteen minutes; at the expiration of which time, on examining the surface, a curdy brown precipitate may be seen gradually sinking to the bottom, leaving the liquor more or less transparent; and then the operator should subject the contents to the process of bag filtration. The liquid that passes through the filter is to be received by a copper vessel; and then the lead (of which it contains a considerable quantity) is to be separated by an operation termed by the patentee "gasing," which consists in passing sulphurous acid gas through it until, on a portion of the liquid being tested, it shall yield no trace of lead.

The processes of gasing and testing are conducted as follows:—Supposing the liquid to be operated upon to result from a solution of two parts of sugar and one of water, it will be viscous, and must be agitated during the application of the gas; and, after the gas has been transmitted through it for about ten minutes, the liquid should be tested to ascertain whether it contain lead in solution or not. At the side of the operator should be placed two or three filters of filtering paper, "each about four inches diameter in the round" (*i. e.* before being folded into a conical shape)—a bottle containing hydrosulphate of ammonia (made by transmitting a current of hydrosulphuric acid gas through an aqueous solution of ammonia) or an aqueous solution of hydrosulphuric acid—a few clean straws—a solution of sugar of lead (twenty grains to the fluid ounce of distilled water)—some filter supports—test glasses—a mixture of one ounce of chalk with three ounces of water—and a Berlin-ware boiling dish. To test the liquid, the operator puts about a fluid ounce of it into the Berlin-ware boiling dish; boils it over a spirit lamp; adds a tea-spoonful of the chalk mixture; boils it again for a minute; and then pours the boiled liquid on to a filter, previously wetted with water. It should be passed at least twice through the filter;—still it will seldom become quite clear; but this will not interfere with the perfect action of the test. The operator then adds to the filtered liquid ten drops of hydrosulphate of ammonia, or as much of the hydrosulphuric acid solution as will be equal to one-fourth of the volume of the filtered liquid. If the addition of the test occasions the least tinge of blackness, the liquid still contains lead, and must be again subjected to the action of the sulphurous acid gas; but if the test produces no visible effect, or merely a whiteness, it may be concluded that the action of the gas has been continued for a sufficient length of time.

It is desirable to proceed a step further in the process of testing, and for this purpose the patentee uses the solution of sulphate of lead as a counter-test, by dropping a small quantity of it, by means of a straw (the same straw never being used a second time), into the liquid which has been tested, when, if the preceding operations have been effective, a patch of blackness will be observed, which may be permanent or may presently change to white or grey.

When it is ascertained that all the lead has been removed, the liquid is to be heated with all convenient rapidity to 180° Fahr., by steam or other suitable means; chalk, or powdered marble, or other convenient form of carbonate of lime is then to be added, in weight equal to about one-sixth of the weight of the lead material which had been used (the chalk or other carbonate being first reduced to a thin paste by the addition of water to facilitate its admixture with the liquid); after which it is advisable to keep the liquid at the temperature of 180°, for ten or fifteen minutes; and then the liquid is in a fit condition to be filtered previously to being subjected to the action of the charcoal beds.

When applying this invention to the manufacture of sugar from cane juice, it is desirable to render the juice neutral, or slightly alkaline, before treating it with the lead material: he therefore tests it with litmus-paper, and if the color of the paper be changed by acid or acid salts, he neutralizes the same with cream of lime, or with chalk brought to a state of paste by the addition of water. The juice having been heated to 180° Fahr., the chalk is stirred into the same in small quantities at a time until the test no longer indicates the presence of acid; or if lime is used, the process is carried on till slight but distinct alkaline re-action is indicated. The lead material is now to be applied in the manner before described, but in the proportion of about one hundred and fifty grains to each imperial gallon of the juice. The liquid is to be filtered, treated with sulphurous acid gas, and subjected to the action of carbonate of lime (to neutralize the acid), as above described.

When the invention is to be applied to the manufacture of sugar from beet-root or other juice, the patentee takes the same, after it has been treated with lime (as at present practised), and subjects it to the action of the lead material, in the same manner as when treating cane-juice; but larger quantities of the lead material are required to be used.

The lead material is prepared in the following manner:—Twelve gallons of vinegar, of 5 per cent. strength, are heated in a copper vessel to 160° Fahr., and forty pounds of litharge, in a state of fine powder, are gradually introduced (stirring all the time); the temperature is then raised until the mixture boils (the crust which collects at the bottom being frequently broken); and the boiling is continued until the mixture becomes so thick that portions are blown out of the vessel by the process of boiling; at which period the heat should be gradually diminished, and the remaining moisture dissipated by a gentle heat. The patentee says, "the result thus obtained, I consider to be a mixture of two or more of the basic acetates of lead, of which chemists recognize several." This is a cheap mode of preparing the lead material; but the patentee does not claim such preparation, nor does he confine himself thereto. He states that sulphurous acid, combined with a base, such as magnesia, may be employed for separating lead from sugar in solution, but not so advantageously as the sulphurous acid gas.

The patentee claims the combined use of sulphurous acid with lead in the manufacture and refining of sugar.—[*Inrolled in the Inrolment Office, June,* 1848.]

Scientific Notices.

THOUGHTS ON THE SOCIAL POSITION OF MEN OF SCIENCE.

No one can have watched the progress of society in the nineteenth century without perceiving that man, even in the mass, as well as individually, is aspiring to attain some real or imaginary object, which will ensure either luxurious ease or personal importance. This is, in fact, so intense a feeling in many, that no amount of toil is considered too great if they can but compass their wishes. That there ever should be found in the world such a thing as disappointment is perhaps to be regretted; [illegible] according to the old saw, "what is one man's bane is [illegible] gain;" we will therefore laugh, where we can ho[illegible] the vexation of our neighbours, and learn to profit [illegible] folly. Now, as man's judgment is sometimes erring, [illegible] to be wondered at, that when he has attained the object on which he has long set his desires, he should find himself somewhat disappointed by not receiving the enjoyment he conceived his new acquirement would ensure. Thus, when a certain African prince was desirous of impressing on a European embassy an exalted notion of his magnificence, he is said to have undergone the operation of being smeared with blood and powdered with gold dust previous to holding his court. The impression which this display produced must, we think, be somewhat analogous to that which, in a civilized country, is conveyed by the exhibition of inferior or common-place capacity, decorated with a title, denoting intellectual merit. Yet such is the desire for personal aggrandisement, that we find the few degrees of distinction which are conferrable on those who have no pretensions to the honors which wait on *political virtues*, are anxiously coveted, and that frequently by candidates whose only merit consists in the perseverance they display in seeking them. Whether or not this remark applies to the unknown author of a pamphlet now before us, entitled "Thoughts on the Degradation of Science in England,"[*] we cannot determine; but, as he signs himself F.R.S., and seems to deplore the fact of that title having "ceased to reflect any honor upon the bearer," we should rather be inclined to think him an example of those who, by the acquirement of a glittering appendage of human invention, have sought from their fellows that homage which is ever tardily rendered, and seldom to any but those whose minds nature has largely endowed and industry has enriched and expanded to a high degree. When, however, after the attainment of a long-cherished hope, we miss the reward which self-esteem pronounced as certain to be ours, we never for a moment dream that the thing attained is a shadow, but we set about to find some foreign cause for our disappointment. Thus our F.R.S. has discovered that science is degraded, and therefore his *title* is as unsubstantial as that of a duke in a republic, or a prince in exile; and not content with this discovery, he has assigned a cause for the fallen greatness of science, which is none other than the all-pervading and all-absorbing antagonistic influence of the aristocracy. But it would appear, that our author has been impelled to his task of mourning over the wreck of intellectual progress by the published reflections of several gentlemen of great scientific attainments, who considered that science, although respected, had not received sufficient *encouragement* from those whose position in the world enabled them to shower down honors and rewards on its professors. And, as respects the pervading notion of the pamphlet of F.R.S., viz., the prevalence in England of an all-absorbing aristocratic influence, that is also enforced by no less an authority than Sir E. L. Bulwer Lytton, who, in his able work entitled "England and the English," puts forward the doctrine of an all-pervading aristocratic sway in small as well as national affairs, with all the confidence of a well-ascertained fact. It may not, therefore, be without interest to consider whether genius really is working under trammels, and if so, what their nature,—or whether it has that free scope for the exercise of its powers when unobtrusively put forth, which, in a free country, it should be allowed to enjoy. The peculiar appropriateness of such an enquiry at the present time, as regards the action of outward circumstances on the scientific mind, will be conceded, since it gives us the opportunity of joining in the award of public honor to the memory of a recently departed luminary of practical science, who has stamped his name indelibly on the face of this and neighbouring countries, by administering to the ubiquitous propensities of millions of his fellow creatures.

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[*] J. Rodwell, New Bond-street.

If we were intending to pursue a strictly logical enquiry into the "degradation of science," and to the inducing causes thereof, it would be well that the terms *degradation* and *aristocratic influence* were first defined, for we might otherwise, by mistaking their acceptation, be expending much trouble to little purpose. In one meaning, and that not an overstrained one, we should rejoice in "the degradation of science;" for if science were applied to perform some of the most menial but necessary offices, or to ameliorate many of the duties of the workman, we should be releasing humanity from much labor that is loathsome and injurious to health. If, however, "the degradation of science" alludes to the depression in the social sphere of the man of science, that evil, to be of magnitude, must present numerous instances of men who, having successfully directed their efforts towards revealing the great secrets of nature, or to applying them to the public benefit, have been treated with contumely. "Aristocratic influence," too, is of somewhat doubtful meaning, for it may be, and no doubt is, considered by some as analogous in subtlety to that theological bugbear of the age, Jesuitism, which many consider pervades all the resorts of man, and can only be spiritually discerned. Should this be the attribute of aristocratic influence, it would be useless to question its power, much less to attempt to disprove its existence. As, however, facts form the only solid basis on which to build opinions, let us, in order to test the truth of the position of our F.R.S. and those of his inclining, take a familiar example of a man of science, whose ability was acknowledged, whose plans were eminently successful, and whose views (more than those of most men) while being carried out, necessarily came into collision with widely prevailing prejudices, which required to be broken through before he could attain even partial success. George Stephenson, then, was a man whom, in the outset of life, circumstances little favored in his advance to scientific notoriety, and less in the attainment of aristocratic influence; yet, if the power of the aristocracy is so universally felt, he must, in the development of his plans for railroad communication, have had either to encounter and subdue or to win that influence, before he could establish the system of transit which owns him as its originator; and when he had attained, by his inherent ability, the complete success of his designs, he must have felt the degradation of science in his own unacknowledged usefulness and unrequited labors, to bear out the opinion of science being degraded through the neglect of its votaries. But what was the fact? He began life as a poor boy, without education, and without influence. The small means he possessed were diligently improved, to render him fit for his destined career,—the remodelling of land communication,—and, towards the end of life, he enjoyed a competence which ability, when controlled by prudence, seldom fails to acquire. His foresight in the application of steam to "drive the rapid car," was guided by reason, and not, as with the poet Darwin, by imagination merely; he therefore could withstand the ridicule heaped upon his schemes with as much ease as he could refrain from expressing his opinion of the full powers of the new auxiliary to locomotion. If, in the course of his proceedings, he met with opposition from the aristocracy, he must have conquered by gaining over to his views a superior power by argument alone; but the existence of opposition does not appear, for the railroad which he first constructed was looked upon as a national achievement, and deservedly won the attention and admiration of the government of the day; while his abilities gained for him that respect from the then chief members of the government, which only ended with his life. Railroads might, indeed, have raised the opposition of the aristocracy, even if their influence was not antagonistic to scientific advancement, for the rights of landed property, which forms the basis of that influence, were seriously interfered with by the development of railroads; it would not, therefore, have been singular if a combination of landed proprietors had been formed to check the progress of their construction. We have thus, in our argument, taken a position the most favorable for those who would urge the existence of a dominant spirit presiding over practical science, only to crush it as its quickening energies give evidence of new life, but we cannot see that that position will avail the anti-aristocrats; for so great was the encouragement given by the legislature (the personification, according to Bulwer Lytton, of aristocratic influence) to the formation of railroads, that it required to be checked by the mysterious power from without; and, although rashness for awhile took the place of reason in the reform of our land transit, and consequently brought great commercial distress in its train, yet the "father of railroads," as George Stephenson has been justly termed, was not "degraded" by even this revulsion, proceeding as it did indirectly from his exertions, but to the end of his days he was highly esteemed by the nation. And so will his memory be ever respected, for, by economizing time in travelling from place to place, he has virtually lengthened the days of man's existence; although philosophers, in their dark researches, have heretofore failed,—he has given man a comparative ubiquity, and rendered him far more of a social being,—he has, in a certain degree, equalized the value of produce, by inducing a more ready and intimate exchange,—and thus he has offered to posterity the only guarantee for an enduring fame, viz.,—a life eminently useful to mankind. That such an example of exalted excellence (gratefully recorded as it has been by the whole press of the country) should not soothe the disquiet of our degraded F.R.S. and his compeers, and awaken in them hopes of a brighter future, augurs the hopelessness of their case—the little chance they have of receiving justice for their scientific acquirements at the hands of the public. We would, therefore, recommend them to cast aside their faded plumes, and rest content with the more humble garb of respectability, which ordinary capacities can wear with a good grace, without exciting either envy or ridicule. Let them not further strive for the halo of a false reputation, which is the best that high patronage can confer on the undeserving, but with an earnest desire for the intellectual or social advancement of their fellow men, let them diligently seize every opportunity for effecting some tangible public improvement, if they cannot confer some universal benefit on mankind. They will then, being conscious of honest and praiseworthy motives, feel that the neglect of those who are unable to appreciate their efforts, is not the degradation of science, but an evidence that those who shew such neglect to the interests of humanity, however high may be their titles or position, must eventually rank far below the successful votaries of science in the real scale of honor and renown.

ON THE INDUSTRIAL ORGANISATION OF FRANCE.

BEING A REPORT OF THE SOCIETY FOR THE ENCOURAGEMENT OF NATIONAL INDUSTRY.

(Continued from page 132.)

Since the progress of modern nations in the amelioration of the arts, and the augmentation of the powers of nature, to enrich them by more abundant production, is inevitable, it only remains to discover the best means of preventing these general benefits from becoming the property of society, at the expense of individuals. It is the duty of the state to insure the means of existence to those who are deprived of employment by new inventions: a vigilant and careful government should ever give heed to such wants as these, which may be satisfied by means of public works; but individual labor should be remunerated according to the work performed. These works should be varied and extended as circumstances dictate, and diminished when, by a reaction in the industrial world, a fresh demand for laborers may arise. In place of prohibiting the improvements and inventions of genius,—instead of increasing, by caprice or tyranny, the rate of wages,—instead of fomenting struggles, not only ineffectual but actually injurious to the operative portion of the community, there are more intelligent, more equitable, and more efficacious means; viz., by augmenting the personal value of the workmen, and improving and increasing their productive powers. This end may be obtained by developing their intellectual faculties, strengthening their morality, and rendering them skilful in their various trades, through the instrumentality of proper training. The children of industry may also be taught to improve the working faculties, such as touch, hearing, and more especially the sight. The elements of the useful sciences, such as geometry, mechanics, physics, and chemistry, which are daily applied to industry and the arts, may also be brought within their reach.

Let us consider the results already obtained, notwithstanding the present incompleteness of the instruction and education of the working classes. We shall see that, in the same workshop where a common artizan earns but two francs per day, the skilful and intelligent workman receives from three to twelve francs, and even, in the superior branches of the industrial arts, as much as from fifteen to twenty francs. The wages of the common laborer, which only remunerate his brute force, employed in carrying, drawing, or turning, or in fact doing that which might be just as well performed by a horse, or by mechanical power, always remain the same, as his labor never rises in value; he being, in fact, only on a level, in usefulness, with a mere animal; whilst the higher sums are paid to workmen who have, by our assistance, had their intellectual faculties expanded, and thereby gained skill and experience. The advantages thus obtained by the skilful workman do not take anything from the stationary workman, who is merely remunerated for his mechanical labor; nay, whilst the majority are thus rising by their efforts, the small number, who have either not been willing or able to follow them, are even benefited by their advancement; for the products of labor being rendered much superior without increasing their price, or less costly while still equal in quality, the various necessaries of life, such as clothing, food, and lodging, will become cheaper for the common workman; and his position will be improved, even supposing his pay to remain the same. We would therefore ask whether he has a right to complain of the benefit he thus receives from the labor of skilful workmen, and for which he makes no return? The Society of Encouragement has, therefore, always encouraged this gradual progressing skill of the workman, whereby he is ensured a better remuneration. We recommend this progressive system on addressing ourselves to the legislature of the infant republic, requiring the establishment of preparatory industrial schools, and also secondary schools, to afford to children and adults the opportunity of learning the various improvements which may be effected in their several branches of industry. We think we are justified in stating, that if the intelligence of the people is extensively cultivated, it will, in the course of a generation, produce results of immense magnitude, and place our national industry far above the position it now occupies. In following out this plan, in proportion as the number of skilful workmen is augmented, so will their moral and intellectual faculties be expanded, and good feeling, sympathy, and fraternity, will be established between the masters and workmen of all classes. By this means, also, social peace will be much promoted, and the cause of civilization advanced.

We have not yet reached the extreme limits of innovation:—Some persons, in their projects for the amelioration of industry, have proposed the suppression of masters having businesses on their own account. They must have imagined that there no longer existed any laws in France, and certainly had forgotten that the confiscation of life, property, and manufactures, is forbidden; as we hold the same in our right of citizenship. These persons have despised not only the laws of man, but also those of nature. They have not only sought to effect the suppression of private interests, of individual possession, and personal prosperity in workshops, but they imagine, after their own wild fancy, the human heart petrified to a degree of hardness requisite for the accomplishment of their Utopian schemes. In opposition to the unfettered and natural progression above set forth, it has been proposed, in order to benefit the workman, to establish equality workshops, in which the capital should not be the property of one master, but of all the workmen equally. We are assured that experiments, on a large scale, are about being attempted at the national expense.

We should be much pleased if we could divest ourselves of our belief in the extreme difficulty attending establishments of this kind. We grant that if they get a good master (by election if desired), who takes an interest in the business as great as if it involved his own private fortune; and supposing all the subordinates to possess, in their station, virtues and abilities equal to those of their chief; supposing the materials, tools, &c., to be managed with as much care by all as if they were their own private property; and supposing each workman (having no longer the fear of dismissal or reduction of wages before his eyes) to work for all as if he were working for himself; we say that, supposing all these favorable conditions to exist, we then grant the model establishment will succeed.

These indispensable conditions have not, up to the present time, become universally or permanently combined in any country celebrated for its industry; for this reason,—all the extensive experiments attempted in England, Germany, the United States, and even in France, have miserably failed: thus speaks the experience of the past, by which the illusions of the present cannot be flattered. We repeat that we do not pretend to predict infallibly a similar fate for any establishments which may be now founded; on the contrary, we would recommend the experiment to be tried, on a large scale, in a well-conducted establishment, in order that France may learn, at its own cost, whether it is likely to succeed. With respect to certain kinds of labor, which are simple and easy, and require neither great capital nor credit, we are of opinion that superior workmen, both as regards ability and morality, if animated by the same spirit, may work together with advantage; but, to attain this end, they must possess the virtues of the Moravian Brothers. We should be but too happy to witness the birth and advancement of such associations, in which, by a mutual devotion and self-denial, but too rare in all ages, common prosperity may be attained.

Having now explained the conditions necessary for the prosperity of French industry, taken as a whole, we think it will not be out of place to take a general view of the special industry of the most populous and opulent cities of France, such as Lyons and Paris. This must be considered in two lights; first, as regards the condition of the operatives, and secondly, as regards the consumers. Operatives in large towns, and especially those in the capital, are obliged to meet expenses of a more extended and varied nature, not only for absolute necessaries, but also for conventional necessities, acquired by habit; it therefore becomes imperative for them to obtain higher salaries than workmen in other parts of the country. It is also but just to remark, that they are much superior to the great majority of workmen of the same class in small towns and villages; the produce of their labor bears the marks of more care and skill, and their work is executed with greater rapidity.

Cities of the first class could not keep up the manufactures by which they are supported, if the idea were to be carried out of reducing to one price the wages in each profession throughout the whole of France; which would, however, be the inevitable consequence of equal wages to all workmen (whether good or bad) of a single workshop, town, department, or of an entire republic! This subversion of all equity would have for its direct and immediate result the ruin of the workmen of Paris and Lyons, by giving them remuneration inadequate to their comparative talent and effective labor; and this in order to satisfy a theoretical and chimerical notion of equality. It is almost unnecessary to add, that such projects cannot and have not hitherto stood the ordeal of close scrutiny.

. Let us now turn our attention to the works of industry, and the class of consumers whom it is their duty to supply. We will consider some of the most remarkable branches of industry of Paris and Lyons, such as the manufacture of cashmere and silk, the casting and working in bronze, gold, and silver, the manufacture of jewellery, chronometers (both for private use and for nautical purposes), furniture, and tapestry, an infinite variety of ornamental articles, the ornamenting of woven fabrics, painting upon porcelain, working in crystal, and all the tasteful adaptations to useful as well as ornamental products, the manufacture of scientific and artistic instruments, all the intellectual or useful arts connected with typography, scenic arts, and the various trades dependent thereupon, &c., &c. Such is a brief outline of Parisian and Lyonese industry, which is at the same time artisanic, artistic, and scientific.

The greater part of the products are suitable for the use of capitalists and gentlemen possessing a sufficient income to decorate their dwellings and their persons. The operatives of Paris and Lyons have therefore a vital interest in French society retaining or even accumulating, by industry, independent fortunes of sufficient magnitude to enable them to obtain from the arts those delicate enjoyments which are the ornament and the charm of civilization, amongst a people rendered rich and illustrious by the labour and genius of its children.

It is therefore evident, especially in large towns, like Paris and Lyons, that the operative, unless blinded in respect to his own interest, will view large capital, accumulated by the labor of successive generations, as a fund at his disposal, to be drawn out by the tempting productions of his skill. To illustrate our position we will take one article, which gives employment to many trades in Paris. Suppose stringent measures were taken to diminish the number of carriages and saddle horses in Paris; the effect would be immediate injury to the numerous trades connected with the manufacture of carriages and harness, such as working in metal and leather for the harness; in wood, iron, steel, and copper, for the body, framing, wheels, and springs; and in coach lace and other fabrics for the lining, trimmings, and other fittings. All these trades would suffer simultaneously; the weight of which would fall upon the operative.

Suppose that by direct or indirect means the possessors of large fortunes were to be banished from Paris; that the decoration of apartments was rendered more expensive; and that landlords were deprived of a considerable portion of their incomes by excessive taxation;—these measures would have the effect of striking a deadly blow at all branches of industry connected with building; the erection of new edifices would either totally cease, or considerably slacken; the architect would in future construct only smaller apartments to suit smaller incomes; and, above all, ornament of every kind would be dispensed with. The arts of painting, sculpture, and carving, together with that of tapestry, would cease to be cultivated; mohair, damask, satin, and velvet, would give place to lighter silken fabrics; while silk would give place to poplin, poplin to printed calico, and even calico to humble paper. Carpets would diminish both in quantity and quality; while inlaid floors would be replaced by tiling. Gilding, bronzes, 'and sculptures, would be excluded from the apartments, together with all superfluous articles of furniture so well got up in the capital. Thus, by degrees, the products of industry peculiar to Paris and Lyons would fall into decay, and merely the most common sorts of work, at a low price, would be in demand; from which would result, not only injury to masters but also to foremen and workmen.

Paris has now become so considerable in a manufacturing point of view, that the annual value of its manufactured products amounts to more than 150 millions of francs. Now, if measures were taken to prevent Paris being the domicile of the wealthy, the gorgeous and animated arena of luxury and elegance, where taste, so well developed, delicate, ever-changing, and fruitful, continually offers new patterns for other nations to follow,—if a ban were put upon all that excites admiration by its perfection,—we should see Paris sink into insignificance and forgetfulness.

Ever since the middle ages, when permission was given to commoners to amass fortunes by honest and persevering enterprise, the members of the industrial world have, from generation to generation, gradually enriched themselves by the acquisition of land, workshops, warehouses, &c. To form a just idea of this source of opulence in an industrial community, like that of the French, Dutch, English, and Anglo-Americans, compare it with the source of the most fabulous treasures,—with those treasures poured during three centuries by Mexico and Peru at the feet of conquerors who had little sympathy with industry. At the end of three centuries scarcely a trace of these rivers of gold is left upon Spanish ground. And what is the result? Whilst the four eminently industrious nations, by the simple manufacture of their wools, silks, and foreign cotton, by the working of their iron, and mineral coal, by their fisheries, and the produce of their soil, have enriched the community, Spain has sunk into the depth of poverty—a fitting reward for its idleness. Now is the time to ascertain whether it is our desire to retrograde, to divert the course of national wealth, to dry up the channels through which the most fruitful branches of industry are fed, by making war on riches, and by destroying in France the arts which minister to elegance, splendor, and good taste. This is the question which we would desire should receive the most serious attention of the legislature of France.

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Amongst other means which the government possesses of assisting the laboring classes, one of the most considerable is the execution of the great works of which it has the management; but even as regards these there is a limit which ought not to be exceeded, and should always be regulated by the state of the national treasury; for what could be more injurious than to incur present liabilities in order to execute works of questionable utility, and which might hereafter prove so unprofitable as not to defray the expenses. During the last ten years a mistaken view of this subject has been entertained. The construction of roads has been incessantly carried on without any definite plan, many of which remain incomplete, and are consequently unproductive. Financial difficulties, at present so great, are partly owing to the excess of a floating debt, augmented by the injudicious and wasteful labour employed upon works which have yielded no return. Let us avoid this wasteful expenditure, but forthwith complete all public works which it may be possible to do without injury to private companies; whose rights must be held sacred. By this means suitable work will be found for those operatives not otherwise employed. Magnificent projects have been conceived for fertilizing vast territories by an ingenious system of irrigation. A twofold advantage would accrue from this:—employment for the agricultural laborer and the artizan; and a large amount of produce to meet the demand of an increased population. All improvements in agriculture, or means proposed by private individuals for varying or augmenting the produce of the earth, lead to the same end, and are in our eyes infinitely preferable to our incessant applications to foreign countries for food which may be advantageously produced by the industry of our own labors. A great country like France, if it wishes to be master of its own destinies, ought not to be dependent on any foreign supplies, either by land or sea, for the food of its citizens; so as not to be in danger of being starved into compliance. This consideration, which is of the first importance in our estimation, justifies the moderate but necessary protection afforded to national agriculture, and which has hitherto produced beneficial results.

As this protection ceases as soon as the price rises above the average of middling harvests, it does not in any way injure the industrial classes; but it comes to the aid of the agricultural population when, by reason of an abundant harvest, the price falls below such a sum as will fairly remunerate the laborer.

The Society of Encouragement, in taking the side of experience and prudence, would ask, in all cases, for moderate protection, sufficient to guarantee the French producer against a sudden invasion of foreign productions; but, at the same time, does not desire this protection to be so strong as to stifle emulation, or even slacken the desire for improvement, which is the cause of progression in industry. We are aware that the economical laws of a people have necessarily a relation with its political laws and its constitution. We cannot conceive, for national industry, any condition of existence incompatible with a republic, or with the most liberal democracy. The model before our eyes, with regard to the conditions required in a free state, is the social internal organisation of the independent North American States. What can be more fraternal than the social relations of the rich and peaceful citizens of Pennsylvania; what more brilliant and prosperous than the State in which the city of New York has risen, the seat of industry and learning, with a population of four hundred thousand inhabitants, fostering the arts under the blessings of liberty, and the civic and industrial guarantees which, in like manner, we wish to maintain, not only in Paris but in the whole of France? Lastly,—what can we conceive more laborious, more ingenious, and more industrial, than those states which gave birth to Fulton, the first inventor of steam navigation; and to Franklin, who brought heaven's artillery under subjection; who commenced his career as a printer's apprentice, and afterwards became the organiser of his native town, the legislator of independence, and the illustrious ambassador of the American Union to the French nation? We therefore ask, for our industrial community, no other social measures than those which suffice for the support of the equality, liberty, and fraternity, of the citizens of the United States. We prefer taking, as an example, this existing experience to those projects which are the terror both of good workmen and manufacturers, which would end in the immediate or progressive ruin of families; and although no doubt dictated by the best intentions, nevertheless strike terror alike to the ignorant and the wise.

Full of confidence in the enlightenment, equity, and patriotism of the French people, we feel assured that the National Assembly will avoid the dangers to which we have alluded. We are fully of opinion that it will hail with joy any of our suggestions which may tend to the restoration of confidence and credit, as that alone can ensure prosperity to industry.

It is commercial distress which, suppressing through fear a demand for private industry, has robbed the treasury by paying for unremunerative labor, and deprives people of capital which would have paid remunerative labor;—this extraordinary drain upon the national resources, whereby idleness has been fed and honest labor discouraged,—this is the wound to which an heroic remedy must be applied, to re-establish the equilibrium of our finances, the security of employers, and the activity of the workmen;—this is the essential service which the country now requires of the government and the National Assembly.

CONCLUDING OBSERVATIONS.

In the above Report we have felt the necessity of defending most especially, as a fundamental and sacred principle, ***the inviolable liberty of industry,*** in all stations where men assist production, either by their manual labor, their capital, or their intelligence. For to destroy that liberty, or simply curtail it, or make any movement having, or supposed to have, that tendency, is to reproduce what we have lately witnessed, viz., misery invading with rapid strides the whole operative community, who are thus rendered the victims of the best intentions of those who attempted to increase their happiness, but by impracticable means.—[*Bulletin de la Société d'Encouragement.*]

ON THE PRESERVATION OF WOOD;—MORE PARTICULARLY APPLICABLE TO RAILWAY SLEEPERS.

BY MM. HUTIN AND BOUTIGNY.

THE decay of wood arises from the continuous action of damp, and of the oxygen of the atmosphere. These destructive agents penetrate to the heart of the wood by absorption or infiltration, in the natural direction of the circulation of the sap. If, therefore, the wood were protected from this action, it might be preserved for any length of time.

The plan proposed by MM. Hutin and Boutigny consists in drying up the ends, neutralizing their hygrometric properties by partial combustion, and closing them hermetically by the application of a mastic, which penetrates the fibres, becomes incorporated with them, and preserves them from the destructive action of the medium in which they are placed. This simple, expeditious, and cheap process is performed as follows:—The extremities of the piece of wood to be preserved are immersed in any carburet of hydrogen (oil of schistus, for example), which will quickly penetrate the wood; fire is then applied; and when the flame goes out, the wood is to be immersed to the depth of about an inch in a hot mixture of black pitch, tar, and gum lac, which will be slightly drawn in between the fibres, and will form, at each end of the wood, a sort of seal, which closes it, and renders it impervious to decay. The wood is afterwards tarred all over in the usual way.—[*Ibid.*]

METHOD OF PRESERVING TIMBER, USED IN SHIP BUILDING, FROM DRY ROT OR TEREDO.

BY M. QUATREFAGES.

IT is well known, that the worm called the teredo, imported from the colonies, now makes considerable ravages on the coasts of Europe; and that most particularly it occasions great annual loss, by injuring the wood that is stored under water for use in ship building.

In order to preserve the wood, instead of leaving it in a large body of water, as usual, it must be stored up in tanks; into which must be thrown, during the time that the insects are breeding, a sufficient quantity of corrosive sublimate, or any other analogous substance, the action of which shall be known to be sufficiently energetic.

About a quart of the saturated solution of the sublimate,—that is to say, about a pound, would be sufficient to kill all the spawn of the worm contained in 60,000 cubic feet of sea water; but, in practice, this proportion must be augmented, in consequence of the property possessed by the sublimate, of combining with organic substances. For this reason, and also by reason of the difference in price, it would perhaps be preferable to make use of salts of lead or copper.—[*Ibid.*]

ON A NEW ALKALOÏD (PSEUDO-QUININE).

BY M. MENGARDUQUE.

M. MENGARDUQUE states, that M. Pelouze had in his laboratory an extract of quinquina of uncertain origin, which he (M. Mengarduque) was requested to examine by way of analytical exercise. It was a dark reddish brown substance, friable, very bitter, almost insoluble in water, and soluble in acids, which it saturated after the manner of alkaloïds to form saline solutions, and was precipitated by the water in pitchy masses. This substance, when treated by the usual processes for extracting quinine and cinchonin, did not present the least trace of either of those alkaloïds; neither was there any appearance of the cinchovatin of M. Mazzini. M. Mengarduque says, however, that he discovered that which he believed to be a new alkaloïd, and which he has defined in such a manner as to leave no doubt thereof in M. Pelouze's mind, who, he states, followed out his experiments. This alkaloïd differs from the other substances with which it is mixed in the extract, inasmuch as it saturates acids better,—in fact, to such an extent as to separate ammonia from its compounds, such as lime or baryta; and also inasmuch as it is dissolved with difficulty, even in boiling ether. Of these circumstances M. Mengarduque took advantage for its preparation; for which purpose he boiled the extract with its own weight of chlorohydrate of ammonia until no more ammoniacal gas was disengaged. On cooling a brown substance was deposited in great abundance, of a syrupy consistency, on the top of which floated a limpid liquid, of a light amber tint; this liquor was afterwards decanted and filtered, and precipitated by the ammonia. The product, thus obtained, was yellowish and flaky, and became soft and sticky by heat. The author dried it and treated it with cold ether, by which the greater part of it was dissolved; leaving as residuum a white pulverulent matter: this was the new alkaloïd in a state of purity. This product, thus purified, presents the following characteristics:—On being submitted to the action of heat on a plate of platina it melts, and afterwards burns with a blue flame, without leaving any residuum. It is insoluble in water, and insipid; soluble in alcohol, much more so hot than cold,—the alcoholic solution crystallizes with facility in the form of irregular prisms; it is soluble in mineral and organic acids, even in a dilute state; and it is insoluble in ether. It may be precipitated from its saline solutions by ammonia, potash, and soda; and from its alcoholic solutions by water. Lastly, if it be dissolved in water of chlorine, and some drops of ammonia be added, the liquor will assume a reddish yellow color: it is well known that, under the same circumstances, quinine gives a green solution. Its solution in sulphuric acid does not affect litmus paper; it is slightly bitter, and furnishes, on evaporation, fine crystals, which are, in form, flat prisms, chamfered at the ends.

The solution in hydrochloric acid presented all the characteristics of a hydrochlorate, but proved uncrystallizable. On analysis its elementary parts proved to be—

	First.		Second.
Carbon	76·5	....	76·7
Hydrogen	8·1	....	8·2
Azote............	10·2	....	10·4
Oxygen	5·2	....	4·7
	100·0		100·0

M. Mengarduque states, that no alkaloïd has yet, to his knowledge, been found of the elementary composition, and possessing the above chemical and physical properties, and therefore he thinks it may safely be classed amongst the alkaloïds as a new discovery.—[*Comptes Rendus.*]

ON THE OXYDATION OF THE DIAMOND IN THE LIQUID WAY.

BY PROF. R. E. AND W. B. ROGERS.

THE processes for oxydating the diamond, hitherto described, consist in actually burning this gem either in the open air, in oxygen gas, or in some substances rich in oxygen, as nitrate of potassa. In all these experiments a very elevated temperature is required. We have therefore been much interested by the discovery suggested to us by our experiments on graphite, but not completely verified until lately, *that the diamond may be converted into carbonic acid in the liquid way and at a moderate heat, by the reaction of a mixture of bichromate of potassa and sulphuric acid*, in other words, *by the oxydating power of chromic acid.*

To succeed in the experiment, it is necessary to reduce the chips of diamond to *a very fine powder*, by trituration with repeated portions of pure siliceous sand in an agate mortar. A single grain weight of the gem will suffice for several experiments. In our repeated trials we have generally used less than half a grain, and we have obtained unequivocal proof of oxydation, by the evolved carbonic acid, when using less than two-tenths of a grain.

The apparatus employed, is in the main, identical with that used in the analysis of graphite, but the Liebig tube is in this case replaced by a vessel containing lime water.

Precautions are necessary to correct a slight error arising from the evolution of a minute amount of carbonic acid from the bichromate and sulphuric acid, caused by the presence of a trace of organic matter or of carbonate in the former.

Operating on half a grain of diamond, we have in a first process obtained half a grain of carbonate of lime, and using the residuary matter have continued the oxydation, until at length the amount of carbonic acid evolved approached nearly to that due to the entire weight of the diamond. In these experiments, the carbonic acid evolved by the bichromate and sulphuric acid is first expelled from the apparatus, by a particular mode of conducting the operation.—[*Silliman's Amer. Jour.*]

SELLERS' LOCOMOTIVE ENGINE FOR INCLINED PLANES.

(Extracted from the American Railroad Journal.)

We accidently witnessed some interesting experiments, when in New York a few days since, with a model locomotive engine, designed to shew the practicability of a locomotive taking any load over grades of one or two hundred feet to the mile, which it will take on a level road; and thus reduce immensely the cost of constructing railroads. Various plans have been heretofore devised to effect this object, but none that have been deemed adequate to the object in view, as no one of them has been introduced into use.

This plan has been invented, and the model brought out, by Mr. Geo. E. Sellers, of Cincinnati, Ohio, formerly of this city, and at one time engaged in the manufacture of locomotives.* The important objects designed, and believed to be attained by this invention, are to allow of the use of lighter engines upon railroads, which shall be more powerful on high grades than the heavy engine now is, and thus to avoid, to a very considerable extent, the rapid destruction of railroads by heavy machinery.

It is not always quite safe, we are aware, to form opinions of machinery on a large scale, and to decide important questions of practical utility, from the working of model machines; yet we were led to examine this machine, and its operations, with some care, as it moved backward and forward on the level portion of the road, laid down for the experiment, and upward and downward on the grade of 276 feet in the mile; and we were deeply impressed with the opinion that it is destined to exercise a powerful influence in aid of the extension of railroads in this country. The statement of one fact—if it be a fact, and we do not doubt it in the least—will, we think, convince most persons that it will give a new impulse to, and rapid extension of, the railroad interest, especially in this country. We were led, by its performance, to believe that a locomotive on this plan, upon a road built, as designed, for its use, with a middle rail on grades, and at the ordinary stopping places, will start a train of cars and take them over grades of 100 to 200 feet in the mile, which it cannot haul, at a profitable speed, even if at all, on a level road. This is a bold and startling assertion; an assertion, however, which will be fully verified, if we may safely draw inferences from these model facts to practical machines.

The arrangement of the additional machinery of this model is such that, when put in operation, the adhesion upon the centre rail is in proportion to the gravity of the entire train of cars, instead of the weight of the locomotive; and the beauty of its operation is, that this application of increased power does not add to the wear or injury of the road,—as it is brought to bear on the sides of the centre rail, instead of on the top of the ordinary rails. It has another important feature, of great value, in its ability to descend high grades with entire safety, and to arrest and reverse its movement, and ascend or descend at pleasure with its load, on any grade upon which it is designed to work.

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* A description of this invention, patented in England in the name of Newton, is given in Vol. XXXII., p. 250, Conjoined Series.—[*Ed. L. Jour.*

Mr. Sellers has also provided a "safety brake" for the cars, in case of their disconnection on high grades, which will effectually prevent accidents, as it arrests their descent before they acquire momentum. We saw the experiment tried with entire success on a grade of 276 feet in a mile; and the moment the car parted from the engine the brake fell, and clutched the centre rail, and held it until the engine backed down and took it again in tow. Not satisfied with a single examination, we returned again the next day for the purpose of verifying or discarding our first impressions, and the result was a full confirmation of them.

There are probably some practical difficulties to be obviated, though we are unable to point them out, yet we have little fear but that the mind which has accomplished so much—or some other equally ingenious—will remove them.

REVIEW.—*On the Subject-Matter, Title, and Specification of Letters Patent for Inventions, and Copyright of Designs for Articles of Manufacture.*—By THOMAS WEBSTER, ESQ.—F. Elsworth, Chancery Lane.

A NEW work on patent law and practice, which should propound any novel principles of action, or bring forward any points which have hitherto been passed over, is as little to be expected as desired, after the elaborate works on patent law from the pens of Mr. Godson, Mr. Hindmarch, and our present author, Mr. Webster; it is not therefore reasonable to expect that novelty is the feature of the work before us. Its proper designation, we think, would be, *a manual for inventors*, for in the work, (which consists of some hundred pages,) all the points necessary for an inventor's consideration, are concisely and clearly given. The subject under discussion is appropriately divided under several heads, and the various questions raised are clearly answered by cited cases. The following extract will shew the mode of treating the "subject-matter" of patents for invention:—

> "An invention may consist in the application of an axiom or proposition of abstract science, of a law or principle of physical science, to a special purpose, or in some peculiar arrangement of matter whereby those axioms or laws are in a condition to act. And it will be material to enquire whether the application of the axiom and principle to a specified purpose, and with an assigned object, or the particular arrangement whereby it is applied, is the substantial and essential part of the invention."

The failing to distinguish between these two kinds of patentable inventions, so as to define the real essence of the invention, has too frequently effected very opposite and unsatisfactory results, viz., 1st, confining the claim to the means shewn when the principle of action might have been secured; and 2ndly, the claiming of a principle when the means would have given ample, or was in fact the only sure, ground for protection. In the first class of cases the principle has been sacrificed, and thrown to the public; and in the second, the patentee has altogether failed to secure his invention. As a familiar example of the distinctive qualities of inventions, take the following:—

> "Inventions may be viewed in one of two classes, the one where the particular arrangement of matter is the substance of the invention, so that the result or effect produced is the real subject-matter; the other, where the particular mode of attaining the arrangement or result, is the substance of the invention, so that the real subject-matter is the mode of production. Thus the first stocking made by hand was a new invention or manufacture, belonging to the former class, and the first stocking made by machinery was also a new invention, belonging more properly to the latter class. Under one of these two classes—the thing produced, or mode of production—inventions may be classified."

A question often arises in the minds of inventors as to the possibility of securing, under a patent, improvements which appear of trifling importance. Our author has some judicious remarks on this head. After observing that the legal sufficiency of the invention does not depend on the thought, labor, or skill, which has been bestowed upon it, he says,—

> "But though the amount of invention, and the consequent sufficiency of a change to support a patent, cannot be directly estimated or ascertained, they may be estimated and ascertained from the result; and with this view two things have to be considered, viz., the nature of the change and its consequences. The change may be considerable, that is, may of itself exhibit traces of thought, skill, and design; the consequences produced thereby may be important and considerable, or unimportant and inconsiderable; in the former case, both the means and the result may be new—in the latter, the means new and the result the same—in both cases there will be a sufficient invention. Next, the change in itself may be inconsiderable or minute, that is, exhibiting of itself no trace of thought, skill, or design; and the consequences produced thereby may be important and considerable, or unimportant and inconsiderable; in the former case both the means and the result will be new, and there will be a sufficiency of invention—in the latter, the means will be new, but the result unchanged, or there will be an insufficiency of invention. These four cases, the only cases which can occur, are all included in the following general proposition and practical test—that whenever the change and its consequences, taken together and viewed as a sum, are considerable, there must be a sufficiency of invention to support a patent. Thus, when the change, however minute, leads to consequences and results of the greatest practical utility, as in the case of Dudley's, Crane's, Hall's, and Daniell's patents, the above condition is satisfied; but if the consequence, as in the case of Fussell's, be inconsiderable, the change also being inconsiderable, and such as would most readily suggest itself to any one, the

condition is not fulfilled, and the invention is not sufficient to support a patent."

As a general remark, the following, which refers to the afterthoughts of inventors, is not without its value. We should, however, in spite of the "justice of the case," as set forth, be glad to see a bridle put upon the discursive fancy of patentees, and tie them down to at least the ideas they possessed when soliciting their patent:—

> "It has been raised as a ground of objection to a patent, that parts of the apparatus described in the specification were invented subsequently to the date of the letters patent; but this objection has been overruled, on the grounds that time is given to an inventor to prepare his specification, for the express purpose of allowing him opportunity of maturing the practical details of his invention. This doctrine is consistent with the justice of the case, for it must be remembered that the necessity of secrecy prior to the sealing of the letters patent renders proper experiments extremely difficult. Further, this doctrine is not only consistent with, but a necessary consequence of, the views advanced in the preceding pages respecting invention. And here the question presents itself, when, consistently with the language of the petition, a person may be said to be in possession of an invention. This may truly be said to be the case so soon as the party has satisfied himself of the applicability in practice to the peculiar requirements of the case, or the truth, or law, or property of matter, proposed to be applied. A correct acquaintance with these truths, laws, and properties, combined with some experience in practical inventions, will enable a party to say, with confidence, that he is in possession of an invention, although it may never have been put into actual practice. This view of the case is consistent with the history of invention generally, from which, so far as we can judge, it would appear that many of the greatest improvements have been the result of accident rather than of design."

The specification, which must be esteemed as the title-deed of the patent, receives our author's careful consideration. This is a document which perhaps no amount of verbal instruction would enable a person not conversant with such matters to prepare, inasmuch as every case will differ; and therefore it is practical knowledge alone which will be found equal to every emergency. The following extract will illustrate this:—

> "The difficulty of avoiding the objections just adverted to [old parts being mistaken for new] is greater than at first sight appears, especially in an advanced state of the arts and manufactures, when the changes which mark and constitute the progress of invention are necessarily small, and from the necessity which frequently exists, in order to comply with another requisite of the proviso in question, of describing, either partially or fully, many things or processes in respect whereof no claim to invention is intended to be made. In order to avoid this objection, it is not unusual to introduce, at the close or other part of the specification, certain formal disclaiming and claiming clauses; but such clauses are, in many cases, wholly unnecessary, and not unfrequently give rise to formal objections as to their validity, and to wrong impressions as to the real spirit of the invention, in proceedings in which the patent is impeached, or when the infringement complained of does not accord, in every particular, with the precise terms of the

claim. It should be borne in mind that formal disclaiming and claiming clauses are, in point of law, wholly unnecessary; and that though, in some cases, as where the step or point of invention is small, and capable of being well defined, such clauses may be advisable and expedient, yet many cases exist in which they are inexpedient and injurious. It is impossible to lay down any general rule; each case must be regulated by its own special circumstances; but so long as what is intended to be claimed and represented as the invention can be gathered and ascertained from the whole instrument, the courts will overrule mere technical objections, and support the validity of the grant of the crown."

We have thus hastily glanced at Mr. Webster's work, which we consider admirably adapted to inform inventors upon the more essential conditions of patent protection. But in recommending to intending patentees a work such as this, wherein numerous cases are cited to illustrate and enforce certain positions, we would particularly guard them against drawing inferences, as it were, with a cart-rope, for in so doing they will certainly come to very wrong conclusions. If an inference to suit a particular case cannot be drawn with a cord as slender as a spider's web, we would advise that printed instructions be dropped, and that the opinion of a professional man be taken. With this premonitory caution we would recommend Mr. Webster's work to the attention of all who are, or may hereafter be, interested in patent inventions.

The notice of the Copyright Acts, while it states all that is generally received as authentic on this subject, in no way makes clear or even attempts to fathom the intentions of the legislature in presenting the inventive world with that symbol of protection —the Non-ornamental Designs Act.

THE NEW REGULATIONS FOR ENROLLING SPECIFICATIONS OF PATENTS.

However little may have been effected in the late session of Parliament as respects the general business of the nation, one Act at least has passed which augurs well for the future prospects of an interest which has been too long neglected. The Act to which we refer does not, however, directly affect more than the routine business of some of the Chancery offices; but inasmuch as it shews that the convenience of persons interested in patent inventions has been consulted, we think it may be looked upon as the insertion of the wedge which is to split asunder the combined interests that now form a stumbling-block to useful legislation upon the patent laws of inventions. By the Act 11 & 12 Vic., cap. 94, which principally relates to the regulation of the Petty Bag Office, it is made imperative that from the first day of January, 1849, the enrolling of specifications and disclaimers of inventions, shall be confined to the Enrolment Office, instead of having three receiving offices for such documents. Powers are also given to the Master of the Rolls to regulate the custody of specifications after they have been enrolled; and it is, we understand, his determination to allow all specifications to remain for a certain period at the Enrolment Office, whence, at the expiry of that time, they are to be removed and deposited, as hitherto, in the Rolls Chapel Office. It will thus be a matter of certainty for any person desirous of inspecting a specification, when he has ascertained the date of the patent, to determine at once where it is to be found, without the inconvenience of hunting at the different offices, and paying a fee to each, in two cases often for a useless search. There is also provision in the Act for determining the genuineness of office copies, and making them admissible as evidence in all courts of judicature: this is a very desirable point, and will prevent much useless expense for witnesses to authenticate the copies, in cases of infringement. Subjoined we give an extract of so much of the Act as may be considered of interest to inventors:—

"And be it enacted, That from and after the First Day of *January* One thousand eight hundred and forty-nine every specification or instrument in writing for describing or ascertaining any invention, and to be enrolled in Chancery in pursuance of Letters Patent under the Great Seal, shall be enrolled in the Enrolment Office of the Court of Chancery; and every Disclaimer and Memorandum of Alteration to be enrolled in pursuance of an Act passed in the sixth year of the reign of His late Majesty King *William* the Fourth, intituled *An Act to amend the Law touching Letters Patent for Inventions,* shall also be enrolled in the said Enrolment Office, whether the specification of the invention to which such Disclaimer or Memorandum of Alteration shall relate shall or shall not have been enrolled in the said Enrolment Office; and the enrolment of every such Disclaimer and Memorandum of Alteration in the said Enrolment Office shall be and be deemed to to be the enrolment thereof in the proper office, in pursuance of the provisions of the said Act.

"And whereas it is expedient to facilitate the proof of the due enrolment of specifications, deeds, and other instruments in the said Enrolment Office, and also of copies of the enrolments thereof: be it therefore enacted, That such a seal or stamp as the Master of the Rolls shall approve of shall be provided and kept in the said Enrolment Office, and from time to time, when the Master of the Rolls shall think fit, a new seal or stamp shall be provided in place of any seal or stamp for the time being kept and used in the said office, and whenever any new seal or stamp shall be so provided the old seal shall be forthwith cancelled; and the seal for the time being kept and used in the said Enrolment Office in pursuance of this Act shall be and be called the Seal of the Enrolment Office in Chancery, and all Courts and other Tribunals, Judges, Justices, Officers, and other persons whomsoever, shall take notice of the said Seal of the Chancery Enrolment Office, and shall take notice of and receive in evidence every instrument and writing purporting or appearing to be sealed or stamped therewith, without proof that the same has been so sealed or stamped.

"And be it enacted, That the Clerk of the said Enrolment Office, or his Deputy or Assistent, shall, upon request, and payment of the proper fees payable in respect thereof, indorse or write upon every specification, instrument, and document which at any time heretofore has been or at any time hereafter shall be enrolled in the said Enrolment Office, a certificate that such specification, instrument, or document has been or was enrolled in Chancery, and the day on which such enrolment was made, and shall cause such certificate to be sealed or stamped with the said Seal of the Chancery Enrolment Office; and every such certificate purporting or appearing to be so sealed or stamped shall be admitted and received in evidence by all Courts and other Tribunals, Judges, Justices, and others, without further proof, and as sufficient *primâ facie* evidence that the specification, document, or instrument therein mentioned was duly enrolled in the Court of Chancery on the day and at the time mentioned in such certificate.

"And be it enacted, That every document or writing sealed or stamped or purporting or appearing to be sealed or stamped with the said Seal of the Chancery Enrolment Office, and purporting to be a copy of any enrolment or other record, or of any other document or writing of any description whatsoever, including any drawings, maps, or plans thereunto annexed or indorsed thereon, shall be deemed to be a true copy of such enrolment, record, document, or writing, and of such drawing, map, or plan (if any) thereunto annexed, and shall, without further proof, be admissible and admitted in evidence, as well before either House of Parliament as also before any committee thereof, and also by and before all Courts, Tribunals, Judges, Justices, Officers, and other persons whomsoever, in like manner and to the same extent and effect as the original enrolment, record, document, or writing could or might be admissible or admitted in evidence, as well for the purpose of proving the contents of such enrolment, record, document, or writing, and the drawing, map, or plan (if any) thereunto annexed, as also proving such enrolment, record, document, or writing to be an enrolment, record, document, or writing of or belonging to the said Court of Chancery, and that such enrolment, record, document, or writing was made, acknowledged, prepared, filed, or entered on the day and at the time when the original enrolment, record, document, or writing shall purport to have been made, acknowledged, prepared, filed, or entered.

"And be it enacted, That it shall and may be lawful for the Master of the Rolls to make such rules, orders, and regulations from time to time for the transfer, care, and custody of the records, enrolments, indexes, books, documents, or other proceedings now or hereafter to be filed, lodged, or be in the said Office of the Petty Bag, or in the custody of the said Clerk of the said Office, and the endorsement thereof, and the filing of writs and other proceedings, and all other matters and things relating to the matters aforesaid, as to the Master of the Rolls shall seem fit and proper."

LIST OF REGISTRATIONS EFFECTED UNDER THE ACT FOR PROTECTING NEW AND ORIGINAL DESIGNS FOR ARTICLES OF UTILITY.

1848.

Aug. 29. *John Crutchley De Witte*, of 48, Threadneedle-street, London, merchant, for a pen-holder.

29. *Hilliard & Thomason*, of Birmingham, for a fastening for articles of dress.

Aug. 30. *J. Tylor & Son*, of Warwick-lane, Newgate-street, London, for an improved flush lap-joint for metal goods.

30. *Henry Walker*, of Gresham-street, London, for "the Penelope crochet needle."

30. *William Norris*, of 20, Gloucester-place, Hackney-road, for a wood frame soap cooler.

Sep. 1. *Frederick Charles Rein*, of 110, Strand, London, for "the lavatuba or breast reliever."

1. *Winfield & Simms*, of 26, New Bond-street, London, for a music-stand or easel.

2. *James Gilbert*, of 10, Craven-buildings, Drury-lane, London, and *Charles William Lancaster*, of 151, New Bond-street, London, for an embossing press.

4. *Joseph Guise*, of 75, Margaret-street, Wilmington-square, for a gas-burner and apparatus.

4. *Joseph Horatio Cutler*, of Birmingham, for an eye (for hook and eye).

4. *Deane, Dray, & Deane*, of King William-street, London Bridge, for an improved stove.

4. *Lane & Barkentin*, of Upper Seymour-street, Euston-square, for a safety buckle.

5. *Charles William Lancaster*, of 151, New Bond-street, London, for a gun lock.

5. *Robert Walter Winfield*, of Birmingham, for a letter-balance.

5. *James Kimberley*, of Birmingham, for a cramp for building purposes, and for compressing generally.

5. *François Perroncel & D. G. Wertheimber*, of West-street, Finsbury, for an artificial leech.

6. *William Frederick White*, of Brinton, Norfolk, farmer, for a stack protector.

6. *Hubert & Vargues*, of 63, Margaret-street, Cavendish-square, for a rivet button.

7. *John Callcott*, of 9, Roehampton-street, Vauxhall Bridge-road, for rolling valve brass wind instruments.

7. *William Crane Wilkins*, of Long Acre, for an improved pressure lamp.

9. *William Prockter Stanley*, of Peterborough, ironmonger, for an improved roller mill for crushing grain, seeds, and chemicals.

9. *Jonathan Ashby*, of 3, Bishop's-buildings, Greenwich, engineer, for a screw friction clutch.

11. *William Campbell Sleigh*, of 2, Brick-court, Temple, London, for "l'agrafe facile" (clasp).

11. *Sandford & Owen*, of the Phœnix Works, Rotherham, for portable apparatus for steaming food for cattle.

12. *David Hesse*, of Back Piccadilly, Manchester, for a combination neck-tie.

Sep. 12. *Brown & Jackson*, of Castle-street, London-road, Derby, engineers, for a mill.
13. *Griffiths & Hopkins*, of Birmingham, for a nozzle for candlesticks.
13. *Thomas Horton James*, of 11, Bucklersbury, for a chopping knife.
13. *Burgess & Cooper*, of 18, Crosby-row, Walworth, for a pair of overalls.
14. *Ferguson Miller & Co.*, of Heathfield Works, Glasgow, for a chimney top.
14. *Francis Pastorelli*, of 4, Cross-street, Hatton-garden, for an improved wheel barometer.
14. *Elizabeth Middleton & Margaret Rettie*, of London, for a sanitary urinal or air trap, &c., for preventing effluvia.
16. *John Brockliss*, of Castle Mills, Oxford, flour dresser, for a brush used for flour dressing.
16. *Frederick Walton & Co.*, of Old Hall Works, Wolverhampton, for "the Torricellean shower bath."
19. *Ephraim Smith*, of 4, Carlisle-street, Soho, jeweller, for a spring swivel or hook.
21. *Hammond, Turner, & Sons*, of Birmingham, for an eye (hook and eye).
22. *Francis Mordan*, of 6, Goswell-road, for an adjusting everlasting gold pen.
22. *Samuel Horwood Park*, of Kingswood, near Wootton-under-Edge, Gloucestershire, for a nut-key or spanner.
25. *Thomas Hunt*, of Preston, for an improved metallic packed gland.
26. *Frederick Marsh & Co.*, of Castle-street East, Oxford-street, bath makers, for "the oriental shower bath."
27. *Stephen Peile Babington*, of 31, George-street, Hanover-square, for a hat-peg or support.

List of Patents

That have passed the Great Seal of IRELAND, from the 17*th August to the* 17*th September*, 1848, *inclusive.*

To William John Normanville, of Park Village, in the county of Middlesex, Gent., for certain improvements in railway or other carriages, partly consisting of new modes of constructing the axle-boxes and journals of wheels; also an improved method of lubricating the said journals, or other portions of machinery, by the introduction of aqueous, alkaline, oleaginous, or saponaceous solutions.—Sealed 26th August.

List of Patents

Granted for SCOTLAND, subsequent to August 22nd, 1848.

To Alexander Turriff, of Hamilton-street, Paisley, engineer, for certain improvements in railway turn-tables.—Sealed 23rd August.

Richard Shaw, of Gold's-green, West Bromwich, railway-bar finisher, for improvements in the manufacture of iron into tyre-bars, round bars, square bars, and flat bars, T-iron, angle-iron, and trough-iron.—Sealed 23rd August.

Isaac Taylor, of Stanford Rivers, Essex, for improvements in preparing and engraving surfaces; also in the construction of cylinders adapted for engraving; and also in machinery for printing and ornamenting surfaces.—Sealed 28th August.

George Walter Pratt, Rochester City, State of New York, for improvements in the manufacture of printing-ink,—being a foreign communication.—Sealed 30th August.

Elizabeth Dakin, of No. 1, St. Paul's Churchyard, London, widow, in right of her late husband, William Dakin, for improvements in cleaning and roasting coffee, in the apparatus and machinery to be used therein, and also in the apparatus for making infusions and decoctions of coffee.—Sealed 31st August.

William Hunt, of Dodderhill, Worcestershire, chemist, for improvements in obtaining certain metals from certain compounds containing these metals, and in obtaining other products by the use of certain compounds containing metals.—Sealed 5th September.

Richard Madigan, of Haverstock-hill, Hampstead-road, London, civil engineer, and John Coope Haddan, of 14, Lincoln's Inn Fields, London, civil engineer, for improvements in the manufacture of wheels for railways.—Sealed 5th September.

Joseph Lillie, of Manchester, engineer, for certain machinery or apparatus applicable for purifying and cooling liquids, and for purifying, condensing, and cooling gases.—Sealed 7th September.

Thomas Dunn, of Windsor Bridge Iron Works, Rendleton, near Manchester, for improvements in the manufacture of railway wheels and axles, and in machinery and apparatus for placing carriages on to a line of rails, for removing them from one line of rails to another, and for turning them.—Sealed 7th September.

William Swain, of Pembridge, Herefordshire, brick-maker, for certain improvements in kilns for burning bricks, tiles, and other earthen substances.—Sealed 7th September.

William Edward Hollands, of Regent's Quadrant, London, dentist, and Nicholas Whitaker Greene, of Walton-place, Chelsea, London, for a new manufacture of artificial fuel in blocks or lumps.—Sealed 7th September.

Mary Campbell, of Longforgan, parish of Longforgan, Perthshire (in right of her deceased husband), for certain improvements in the driving machinery of thrashing, grinding, and other mills.—Sealed 8th September.

Alexander Alliott, of Lenton Works, Nottinghamshire, for improvements in apparatus connected with the working of steam-boilers; also in spring apparatus, in balances, and in the means of working breaks.—Sealed 11th September.

New Patents

SEALED IN ENGLAND.

1848.

To William Young, plumber, and Henry Burgess Young, engineer, both of Barnstaple, in the county of Devon, for improvements in smelting and refining lead ores. Sealed 28th August—6 months for inrolment.

Charles Rowley, of Birmingham, button manufacturer, for improvements in the manufacture of buttons. Sealed 28th August—6 months for inrolment.

Elizabeth Chrees, of Homerton Castle, Homerton, for improvements in the manufacture of sealing wax. Sealed 29th August 6 months for inrolment.

Peter Wright, of Dudley, in the county of Worcester, vice and anvil manufacturer, for certain improvements in the manufacture of vice boxes, and in the machinery for effecting the same. Sealed 31st August—6 months for inrolment.

George Nasmyth, of Ebury-street, Pimlico, civil engineer, for certain improvements in the construction of fire-proof flooring and roofing; which improvements are also applicable to the construction of viaducts, aqueducts, and culverts. Sealed 4th September—6 months for inrolment.

William Wheldon, engineer to Messrs. John Warner and Sons, of Jewin-crescent, brass-founders and engineers, for improvements in pumps or machinery for raising or forcing fluids. Sealed 4th September—6 months for inrolment.

John Lewis Ricardo, of Lowndes-square, Middlesex, Esq., M.P., for improvements in electric telegraphs, and in apparatus connected therewith. Sealed 4th September—6 months for inrolment.

William Edward Hollands, of Regent's-quadrant, Middlesex, dentist, and Nicholas Whitaker Greene, of Wilton-place, Chelsea, Gent., for a new manufacture of artificial fuel in blocks or lumps. Sealed 4th September—4 months for inrolment.

William Losh, of Newcastle-upon-Tyne, for improvements in steam-engines. Sealed 4th September—6 months for inrolment.

Henry Smith, of Vulcan Works, West Bromwich, for improvements in the manufacture of railway wheels. Sealed 5th September—6 months for inrolment.

William Dickinson, of Blackburn, in the county of Lancaster, machine maker, for certain improvements in and applicable to looms for weaving. Sealed 11th September—6 months for inrolment.

Robert Walter Winfield, of Birmingham, merchant and manufacturer, and John Ward, of Birmingham, aforesaid, a workman in the employ of the said Robert Walter Winfield, for certain improvements in the manufacture of tubes, and in the manufacture of certain articles made in part of tubes. Sealed 14th September—6 months for inrolment.

William Sager, of Rochdale, Lancashire, wool dealer, for certain improved means and apparatus for effecting the transit or conveyance of goods, passengers, and correspondence, by land or water, and for other such purposes,—part or parts of which means and apparatus constitute a new and improved method of generating steam; which improvement is applicable to other purposes to which steam is generally applied as a motive power. Sealed 15th September—6 months for inrolment.

Joseph Lillie, of Manchester, engineer, for certain machinery or apparatus applicable for purifying and cooling liquids, and for purifying, condensing, and cooling gases. Sealed 21st September—6 months for inrolment.

John Frearson, of Birmingham, machinist, for improvements in bending or shaping iron or steel and other metals. Sealed 21st September—6 months for inrolment.

Henry Wilson, foreman to Messrs. William Greaves and Sons, of the Sheaf Works, Sheffield, for improvements in the manufacture of chisels and gouges. Sealed 21st September—6 months for inrolment.

William Brown Rooff, of Stanhope-street, Regent's-park, in the county of Middlesex, chemist, for certain improvements in the construction of respirators. Sealed 21st September—6 months for inrolment.

Robert Stirling Newall, of Gateshead, Durham, for improvements in locks, in springs, and in the means of fastening and setting-up the rigging of ships. Sealed 28th September—6 months for inrolment.

Andrew Paton Halliday, of Manchester, manufacturing chemist, for certain improvements in the manufacture of pyroligneous acid. Sealed 28th September—6 months for inrolment.

Fennell Allman, of Charles-street, St. James's-square, in the city of Westminster, consulting engineer, for certain improvements in apparatus for the production of light from electricity.—Sealed 28th September—6 months for inrolment.

William Wilkinson Nicholson, of Acton-street, Gray's-inn-road, Middlesex, civil engineer, for improvements in machinery for compressing wood and other materials requiring such a process. Sealed 28th September—6 months for inrolment.

Joseph Gillott and John Morrison, of Birmingham, for improvements in ornamenting cylindrical and other surfaces of wood and other material. Sealed 28th September—6 months for inrolment.

Disclaimer and Amendment

OF PART OF AN INVENTION

MADE UNDER LORD BROUGHAM'S ACT.

Disclaimer filed with the Clerk of the Patents for England, on the 2nd September, 1848, to the specification of a patent granted to Henry William Craufurd, of John-street, Berkeley-square, in the county of Middlesex, dated 29th April, 1837,—for an improvement in coating or covering iron and copper, for the prevention of oxidation.

CELESTIAL PHENOMENA FOR OCTOBER, 1848.

D.	H.	M.	
1			Clock after the ☉ 10m. 25s.
	—		☽ rises 9h. 59m. M.
	—		☽ passes mer. 2h. 53m. A.
	—		☽ sets 7h. 41m. A.
3			Juno in Perihelion
5			Clock after the ☉ 11m. 39s.
	—		☽ rises 1h. 33m. A.
	—		☽ passes mer. 6h. 3m. A.
	—		☽ sets 10h. 35m. A.
	2	1	☽ in □ or first quarter
6	12		☿ in conj. with Pallas, diff. of dec. 21. 37. S.
7	7	46	☿ in conj. with Ceres, diff. of dec. 7. 35. S.
	20	49	♀ in conj. with Pallas, diff. of dec. 19. 20. S.
8	16	30	♀ in conj. with Ceres, diff. of dec. 4. 59. S.
10			Clock after the ☉ 13m. 2s.
	—		☽ rises 4h. 28m. A.
	—		☽ passes mer. 10h. 19m. A.
	—		☽ sets 3h. 4m. M.
	—		Occul. *n* Piscium, im. 11h. 32m.
	5	40	♄ in conj. with the ☽ diff. of dec. 2. 38. S.
11	5	59	♃'s second sat. will im.
12	3	56	Ecliptic oppo. or ○ full moon
12	4	9	♅ in conj. with the ☽ diff. of dec. 1. 58. N.
13			Occul. 85 Ceti, im. 11h. 17m. em. 12h. 6m.
13	0	9	♅ in oppo. to the ☉
	7		☽ in Perigee
14	6	52	♀ in the descending node
15			Mercury R.A. 14h. 52m. dec. 19. 23. S.
	—		Venus R. A. 14h. 49m. dec. 16. 18. S.
	—		Mars R. A. 13h. 24m. dec. 8. 22. S.
	—		Vesta R. A. 23h. 46m. dec. 13. 45. S.
	—		Juno R. A. 5h. 44m. dec. 5. 27. N.
	—		Pallas R. A. 14h. 26m. dec. 5. 28. N.
	—		Ceres R. A. 14h. 28m. dec. 9. 41. S.
	—		Jupiter R. A. 9h. 23m. dec. 15. 57. N.
	—		Saturn R. A. 23h. 25m. dec. 6. 16. S.
15	—		Georg. R. A. 1h. 15m. dec. 7 18. N.
	—		Mercury passes mer. 1h. 16m.
	—		Venus passes mer. 1h. 12m.
	—		Mars passes mer. 23h. 46m.
	—		Jupiter passes mer. 19h. 44m.
	—		Saturn passes mer. 9h. 47m.
	—		Georg. passes mer. 11h. 37m.
	—		Clock after the ☉ 14m. 13s.
	—		☽ rises 7h. 21m. M.
	—		☽ passes mer. 2h. 5m. M.
	—		☽ sets 9h. 41m. M.
15	14	20	♃'s first sat. will im.
	—		Occul. o^2 Tauri, im. 9h. 7m.
16	8	48	♂ in conj. with the ☉.
	—		Occul. *n* Tauri, im. 11h. 47m. em. 12h. 39m.
17			Occul. [illegible] Geminorum, im. 10h. 6m.
17	13	52	☿ greatest elong. 24. 23. E.
18	17	43	♃'s second sat. will im.
	—		Occul. 1 Cancri, im. 17h. 50m. em. 19h. 7m.
19	6	28	☽ in □ or last quarter
19	8		☿ in conj. with ♀ diff. of dec. 2. 51. S.
20			Clock after the ☉ 15m. 10s.
	—		☽ rises Morn.
	—		☽ passes mer. 6h. 49m. M.
	—		☽ sets 2h. 14m. A.
	14	20	♃ in conj. with the ☽ diff. of dec. 3. 29. N.
	23		☿ greatest hel. lat. S.
22	14	48	♃'s fourth sat. will em.
22	16	13	♃'s first sat. will im.
25			Clock after the ☉ 15m. 51s.
	—		☽ rises 4h. 44m. M.
	—		☽ passes mer. 10h. 38m. M.
	—		☽ sets 4h. 24m. A.
26	5	26	♂ in conj. with the ☽ diff. of dec. 2. 59. S.
27	2	26	Ecliptic conj. or ● new moon.
28	7	52	☿ in conj. with the ☽ diff. of dec. 7. 37. S.
	8		☽ in Apogee
	21	21	♀ in conj. with the ☽ diff. of dec. 5. 36. S.
29	8	18	☿ stationary
30	12	34	♃'s third sat. will im.
	16	7	♃'s third sat. will em.
31	12	35	♃'s first sat. will im.

J. LEWTHWAITE, Rotherhithe.

THE
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No. CCIII.

RECENT PATENTS.

To Charles Lambert, *of Two Mile Hill, Saint George's, near Bristol, in the county of Gloucester, pin-maker, for certain improvements in machinery for making nails.*—[Sealed 5th January, 1848.]

This invention consists in the construction and arrangement of certain novel agents to be applied to a machine wherein heated rods of iron are, by excentric rollers or rotary cams, formed into approximate wedges or series of connected wedges, ready to be cut into separate nails. These novel agents are, firstly, a pair of moveable guides, for conducting forward the end of the rod of heated iron, after it has received from the shaping-rollers its approximate wedge-forms; secondly, the construction and adaptation of cutting and holding dies, the edges of which are employed to slice off, horizontally, a portion of the shaft of each nail, in order to give it on the upper side an inclined or wedge shape, corresponding, or nearly so, to the lateral form of the nail produced by the excentric rollers; thirdly, a peculiar construction of double-cutter, for separating the wedge-formed shafts of the respective nails from the previously shaped rod. In order to clearly explain these improvements, the patentee has shewn the general construction of a machine for manufacturing wrought-iron nails from heated rods of iron, by the known process of excentric rollers or rotary cams, with his improvements adapted thereto.

In Plate X., fig. 1, represents, in horizontal view, a machine for making nails, the novel parts being combined with the old or known mechanism; fig. 2, is an elevation of one side of the same machine; and fig. 3, is a partial vertical section, taken transversely through the machine in a direction indicated by the dotted lines A, B, of figs. 1, and 2. This sectional figure exhibits the rotary cams or excentric rollers, by which the square rod of iron is pressed laterally into approximate wedges (but flat at top and bottom) for the formation of separate nails. Fig. 4, represents a detached portion of the machine, in horizontal section, shewing the forms and positions of the rotary cams or excentric rollers *a, a,* by which a square rod of heated iron *b, b,* is formed into approximate wedges by lateral pressure, as it passes between the rollers: these rollers are each provided with a horizontal flange, as shewn at fig 3. It is unnecessary to describe minutely the forms of or the manner in which these shaping-rollers are driven, as that is well understood, and is sufficiently shewn by the drawing, and may be varied according to circumstances. Fig. 5, is a detached horizontal section of the novel parts of the machine constituting the three heads of the invention; which parts are not so clearly seen in fig. 1. They are here drawn to shew their positions with respect to the shaping-rollers. Every approximate wedge formed upon the rod of iron *b, b,* under operation, as soon as it has passed from between the shaping-rollers *a, a,* is conducted between a pair of moveable guides *c, c,* whilst the bevil cutting-dies *d, e,* are, by a lever action, made to move inwards, for the purpose of slicing off, horizontally, in an inclined direction, a portion of the upper side of the next preceding wedge-shaped approximate nail. This will be seen in the partial longitudinal section, fig. 20, taken vertically through the middle of the machine. The dies *d, e,* after slicing the bevil piece off the wedge, hold the wedge firmly whilst it is headed, if required, and whilst the double cutters move laterally, and cut the advanced wedge or nail off the forward end of the rod.

The particular constructions and operations of these parts will now be described. Fig. 6, shews, upon an enlarged scale, the moveable guides *c, c,* and their connection with the shaping-rollers *a, a,* in horizontal section. The end of the rod of iron *b*, having advanced from between the shaping-rollers, passes into a box or tubular passage *f*, below (see fig. 1,) within which the moveable guides *c, c,* are placed and operate. These moveable guides consist of two horizontal levers, mounted upon a plate, affixed to the frame of the machine. They turn upon fulcrum-pins *g, g,* (see fig. 6,) and are held open by a spring *h, h,* with forked ends, taking hold of studs at the outer sides of the moveable guides, as shewn in elevation at fig. 7. The ends of the moveable guides have beaks *i, i,* which, by the force of the spring *h,* are made to bear against the peripheries of the cam-rollers *a, a*; and as those cams revolve, their increasing radius, acting against the beaks, causes the levers or guides to collapse; but when the decreasing radius of the cams acts against the beaks (as seen in the figure), then the levers or guides expand, and the channel between them is open for the free passage of the rod.

The rotary movements of the shaping-rollers *a, a,* are effected at intervals by a ratchet-wheel and click, connected with the axle of one of those rollers and with the driving power from the fly-wheel shaft, as represented in the drawings, but which forms no part of the present improvements. Hence, at every movement of the shaping-rollers, or cams, *a, a,* one wedge-form is produced by lateral pressure upon the sides of the heated rod of iron passed between them; and on each temporary cessation of rotary motion the other parts of the machinery are brought into action by cams and levers, or other means, connected with the main driving-axle, in the way shewn in the figure, and well understood by mechanics. The rotation of the shaping-rollers being supposed to be stopped for the moment, and the moveable guides *c, c,* having one of the wedge-shaped portions of the rod between them, as described, the bevil cutting-dies *d, e,* are now moved laterally, for the purpose of slicing off, in an inclined direction, a portion of the top of the next wedge in advance. The construction of these bevil cutting-dies, which constitutes the second head of the invention, will be understood by reference to the detached auxiliary figures 8, to 13, inclusive. Fig. 8, shews the upper surface of one of the bevil cutting-dies *e*; fig. 9, is a similar view of the corresponding bevil cutting-die *d*; fig. 10, is a face view of the die fig. 8; fig. 11, is an end view of the same; fig. 12, is a face view of the die fig. 9; and fig. 13, is an end view of the same.

On the advance of the rod of heated iron being arrested, as above, the wedge formed from that part of the rod which then lies between the cutters *d*, *e*, is acted upon for the purpose of slicing off a portion of the wedge in a bevil direction, to give the inclined shape of the nail a taper towards the point. The movements of these cutters are effected by cams on the main shaft forcing out the tails of the levers *k*, *k*, which cause the opposite ends of those levers to which the cutters *d*, *e*, are affixed, to collapse, and by those means to bring the edges of the dies or cutters, shewn at figs. 11, and 13, to act as shears on the upper edge of the nail-shaft, and thereby to slice off a portion of the shaft, leaving it of the taper form required. The upper parts of the bevil cutting-dies *d*, *e*, having performed the slicing operation, as described, the lower parts of these dies will now press against the sides of the nail-shaft, and hold it firmly, whilst the heading operation, if required, is performed. Or other holding-dies, placed in advance of these, may be adapted to effect the heading; but the particular intention of these holding-dies is to assist the cutting off of the several nails as they advance. The heading-dies may be of various forms, suited to the peculiar shape of head required, as represented in figs. 14, or 15, or of any other desired form; and they may be connected and brought into operation as shewn in the drawing at figs. 1, and 2, or by any of the known mechanism suited to that purpose.

The patentee remarks, that when he desires to make broad wedge or chisel-formed flat-pointed nails, he dispenses with the bevil cutting edges *d*, *e*, and only employs their lower parts as holding dies for heading the wedges, as they come from the shaping-roller. In this case one of the sides may be made stationary, and the other brought up by leverage, to hold the nail-shaft whilst heading. The shaft of the nail being thus held between the dies *d, d,* the third feature of the invention comes into operation, viz., the double-cutters, by which each successive nail is cut off from the end of the rod. The situation of these double-cutters in the machine may be seen at figs. 1, and 5, at *l,* and *m;* but their peculiar construction will be best understood by the enlarged representation at figs. 16, 17, 18, and 19. These cutters are in the machine affixed to transverse sliding-bars *n, n,* working in bearings, which are made to move by means of double inclined planes *p, p,* fixed on the lateral shafts *q, q,* and acting in mortice holes in the transverse sliding-bars *n, n;* the lateral shafts *q, q,* being slidden to and fro by means of excentrics *r, r,* on the main driving-shaft, as shewn at figs. 1, and 2. The cutter or punch *l,* figs. 17, and 19, may be called the projecting cutter; that at figs. 16, and 18, the counter-cutter or recess-cutter *m.* The double cutters, having double cutting edges, are used only when other than clasp or flat-headed nails are made. These cutters *l,* and *m,* are to be brought together by the operations of the machine, as described, when the small part of the rod, connecting the point of one nail with the head of the next nail, stands exactly between the cutting edges, as shewn at figs. 16, and 17; and the intention of the double cutting edges is, that not only shall the end of the forward nail be cut off clean, with a sharp chisel point, but that a small portion of the angular end of the next nail-shaft shall be clean cut off also, in order to prepare it better for the heading operation, and prevent the metal being upset in an irregular shape, when the header advances to crush the metal and form the head; for if the thin end of the junction were allowed to remain, it would not upset concentrically, but be driven on one side, and form an uneven head. The counter-cutter *m,* is hollowed out in the inside, a little distance from its edges, to allow the small piece of iron, which is cut from between the junctions of the two nail-shafts, to drop through.

The patentee claims, Firstly,—the moveable guides for conducting forward the end of the rod of iron, after it has received its wedge shape; such guides being moved laterally upon fulcrum pins—outwardly by the force of a spring or springs—and inwardly by their ends or beaks being acted upon by excentric-rollers or cams at the periods required. Secondly,—the bevil cutting and holding dies, the cutting edges of which are intended to slice off, horizontally, portions of the rod, to bevil each wedge to a corresponding shape with that produced by the rollers, and thereby to produce pointed nails; and also employing the said dies or holders for the heading operations, and for the cutting or separating of the wedges severally from the bar as it advances. Thirdly,—the double-cutters, as they are termed, for cutting off the wedges from the rod, not only at the point, but also a portion at the head of the nail when required: these are claimed, separately or conjointly, however modified, when employed in a machine for making nails. And, Lastly,—the arrangement and combination of the whole machine collectively, when set out and worked in the way above described and exhibited in the drawings.—[*Inrolled in the Petty Bag Office, July,* 1848.]

To JOSEPH JEAN BARANOWSKI, *of Rue Neuve, Clichy, Paris, Gent., for a ready-reckoning machine.*—[Sealed July 19th, 1847.]

THIS invention has reference to certain apparatus and arrangements for ascertaining with facility the results of calculations or reckonings, required to be made in various commercial and other establishments, in which similar results have frequently, or from time to time, to be determined; such, for instance, as the charge for the conveyance of different loads for various distances, at a given rate; or the assessment of government taxes, at a given per centage; or reckonings of interest, or foreign money exchanges, or amounts of wages; or other like purposes, wherein readiness and accuracy are essential, and wherein the result to be obtained is capable of being ascertained from sums or numbers previously calculated, and arranged in a tabular form. This object is attained by adapting to commercial tables or "ready reckoners," an arrangement of apparatus, so constituted as to render the operation of calculating therewith mechanically certain, in place of being, as now, comparatively uncertain and liable to error. And this accuracy and freedom from uncertainty and error is principally ensured, in practice, by exhibiting to the operator, by simple mechanical means, those sums or numbers only which are necessary to, or form part of, the required result. Such being generally the object in view, it is necessary to premise, that, in all calculations effected under this invention, certain numbers must be given or known, from or by means of which certain other numbers are to be found or ascertained; thus, for example, the multiplicand and multiplier, or the dividend and the divisor, being given, the product or quotient respectively are to be ascertained; and any two of the numbers, multiplicand, multiplier, and product, or dividend, divisor, and quotient, being given, the third may be found or ascertained by well known processes of arithmetic. Now these numbers may be arranged in tables; and tables so arranged constitute what are known by the names of commercial tables, ready reckoners, or by other similar names; and the use of such tables, as well as the liability to error in their use, are well known.

The improved ready-reckoning machine consists of a commercial table or ready reckoner, containing the various results previously calculated, and arranged consecutively in units, tens, hundreds, &c. (as well as in fractional parts when desired); of suitable apparatus for bringing the numbers of such table into view; of a face-plate, with openings formed in it, to admit of any portion of such commercial table or ready reckoner being seen when required; and, lastly, of a number of accurately fitted slides, any number of which can be withdrawn, for the purpose of exhibiting the numbers constituting the required result; the other numbers, not required for the result to be ascertained, being concealed from view. The slides and the face-plate are so adapted and arranged that the operator may readily see, from the front of the machine, which slide to withdraw, in order to disclose any required result. The operation of the machine, then, consists in the display of the particular result required, on the withdrawal of the proper slide by the operator, when such result is to be exhibited by a single number or sum on the tabulated surface; but when the result is to be exhibited by, or consists of, t[illegible] or more numbers, then two or more proper slides have to [illegible] withdrawn, by which the two or more numbers are displayed, which, being added together, give the final result. And the same principle is to be followed to any extent required; the machine being, of course, adapted to the particular kind of tabulated surface to be used with it. Thus, the ascertainment of the result, by means of the machine, becomes reduced to the simple operation of exhibiting to view the number constituting the result required, or the numbers to be added together for such result, with the greatest facility.

In Plate X., this machine is shewn, as connected with a calculated table, for ascertaining the charge for carrying a quantity of coals different distances;—the machine or instrument being supposed to be adapted to the principal stations on the London and South-Western Railway. Fig. 1, is a front view of the machine; fig. 2, a vertical section of the same, taken transversely; fig. 3, represents the slides and face-plate of the machine (which is preferred to be of metal) as they would appear when viewed from the inside; and fig. 4, is a horizontal section of the face-plate and slides. *a, a,* is the box or case of the machine, in which is fixed the face-plate *b*; this plate has a long slot formed in it, through which a portion of the slides *c, c,* may be seen; and when the slides are withdrawn, the previously calculated results, engraved or marked upon the tabulated surface behind them, are exhibited to view. The face-plate has also an opening or slot, through which may be seen the multiplicand, or constant number, or sum to be operated upon, which, in the present instance, must be supposed to shew the rate of charge per ton for conveying coals from London to Kingston; and likewise another opening or slot, at the lower part, shewing the name of the station. It is manifest that any suitable information may, in this manner, be displayed for the guidance of the operator. The slides *c, c,* are made to work readily between guides at the back of the face-plate *b,* and correspond in number and arrangement with the results on the tabulated surface placed behind them. Each slide has attached to it a stud or button *e,* the stem of which protrudes through a slot in the face-plate, with a collar working against that plate. The stud is fixed in its place by a nut or collar in the back of the slide *c*; this will be seen most clearly on reference to the detached view fig. 5, which is a representation, in vertical section, on an enlarged scale, of a few of the slides *c*, and a portion of the face-plate *b*. These slides *c, c,* are fitted, as shewn (see fig. 3,) one over the other, with their edges coming together, and are retained in their horizontal position by the stem of the stud or button *e*, at one end, and by resting against the edges of the slide above and below,—the two outside slides and two intermediate ones being supported by having a slot formed upon them, through which a pin or screw is passed into the fixed guide *f*. *g*, is another fixed guide, extending like the guide *f*, across the whole number of the slides *c*. It will be observed, on reference to fig. 1, that each stud or button *e*, has a figure upon it; and that the whole of such studs or buttons are arranged in columns of units, tens, hundreds, &c., and fractions of units (hundred-weights in this case); the numbers indicated by such studs being the multipliers for the product to be exhibited to view on the tabulated surface *h*. By this arrangement the operator can disclose any result he pleases, by the withdrawal of the slide which conceals it from view; such operation being entirely mechanical, except so far as regards attention to the figures and quantities seen on the front of the machine. The extent of the slides' race is controlled by the slots *i, i,* through which the stems of the studs or buttons *e, e,* are passed. *k, k,* (fig. 3,) are two pieces of cloth, fixed on to the face-plate *b*, in order to give ease to the motion of the slides *c*, in their passage to and fro, and to prevent friction between them and the plate *b*. The tabulated surface *h*, consists of a roller with flat sides, one of which is left blank, but the others are provided with cards, one for each station. On each single card are marked the products of the multipliers, in units, tens, hundreds, &c. (as well as in fractions of tons, viz., hundred-weights), into the multiplicand, which, in the present instance, is the rate of charge per ton for the conveyance of coals from London to Kingston. In the drawing, fig. 2, the columns of figures on the cards are sufficiently indicated to exemplify the mode in which they are arranged. The tabulated surface or roller *h*, is mounted in bearings at *l*, from which it may be easily removed, so as to allow of a change of tabulated results being placed behind the slides. At *m*, is a dial, applied to which is an index *n*. This dial is divided out into spaces, corresponding with the number of stations, and one blank space is left, as shewn at fig. 1, in order to point out, through the index *n*, when the machine is at rest. The index *n*, forms a handle, and is fitted on to the square end of the axis *o*, by which means, on turning the said index-handle, motion is communicated to the axis, and through it to the tabulated surface or roller *h*, by the wheels *p*, *q*. *r*, is a ratchet or star-wheel on the axis *o*, with a number of teeth corresponding with the number of divisions on the dial *m*, and roller *h*; so that when the index-handle *n*, is turned from one division of the dial to another, the index is made to point to the name of the station on the dial, and the card containing the tabulated results, referring to the said station, is brought into its proper position behind the slide *c*. The regulation of these movements is effected by the spring-pall or click *s*, dropping into the tooth of the wheel *r*, and retaining it; thereby preventing both the roller *h*, and index *n*, from proceeding beyond its assigned place. In order to render the operation of the machine evident, the position the buttons or studs *e*, and the slides *c*, will assume, when the charge for the conveyance of 642 tons of coals from London to Kingston is to be ascertained, is shewn in the drawings, figs. 1, and 3. It will thus be seen that the studs or buttons, No. 6, in the column of hundreds; No. 4, in the column of tens; and No. 2, in the column of units, have been moved along to the reverse ends of their slots, in the face-plate *b*, through which their stems pass. It will also be seen, on reference to fig. 3, that the slides *c*, to which the said studs or buttons are affixed, have been moved, so that the spaces formed in them come opposite the long slot in the face-plate *b*; and thus the figures on the card behind are allowed to be seen, as is represented at fig. 1. Thus all that has now to be done is to add together the three products shewn, and the total result is given.

Having described one arrangement of this invention, as might be specially adapted to the existing stations on [illegible] London and South-Western Railway, it will be obvious that the names of the stations may be wholly omitted, all that is required to be brought to view being the multiplicand and the products; hence, instead of the names of places being exhibited at the top, and engraved around the dial-plate, the sums of money constituting the multiplicand only will be necessary. Thus, suppose any quantity of materials is to be sent between two particular stations, the attendant will look to the charge per ton, or other measure that may be adopted for that distance, the number indicating that charge will be brought up to view, and the slides being moved according to the number of tons, the total charge will be exhibited to view, as already described. Furthermore, the above arrangement of a ready-reckoning machine is adapted for ascertaining the total amount of any transaction whereof the multiplicand consists of one of the sums of money on the table at the head of the columns of products, and the multiplier is expressed in units, tens, and hundreds, and up to one thousand, inclusive; and it is obvious that the extent of such ready-reckoning machine may be increased at pleasure.

It is also to be observed that the numbers to be exhibited may be dividends, divisors, and quotients, instead of multiplicands, multipliers, and products; and that the arrangements above described may be applied to such purposes, or to a table, properly constructed, in which the multiplicands are quantities of goods, and the multipliers varying rates of money, the slides being arranged according to pounds, shillings, and pence, instead of units, tens, and hundreds of tons, as in the present case.

The modifications of the apparatus described above are numerous; for instance, instead of a card, or series of cards or tabulated surfaces, fixed on a roller, mounted as shewn and described, a more simple form might be adopted, if preferred, consisting merely of a flat card, placed in the machine behind the slides. In such case it would be necessary to insert a fresh card for each station, or multiplicand, or dividend, as already described.

It will also be evident that any cards or tabulated surfaces, whereon the results tabulated are in the relation of multiplicand, multiplier, and product, or dividend, divisor, and quotient (so that the same may be conveniently and accurately read on the withdrawal of the slides), may be adapted to, and employed in, the ready-reckoning machine. In the drawings appended to his specification the patentee has represented, in front or face view, the ready-reckoning machine, as applied to reckon workmen's wages. In this instance the number or factor which has been called the multiplicand is placed upon the dial *m*, and indicates the rate of wages per day; and the number or factor which has been called the multiplier is contained in the series of numbers of days, weeks, and hours, shewn on the buttons of the slides *c*, and the face-plate *b*. Hence it will be evident that, in order to operate with this machine, the index-handle *n*, must be turned to the given rate of wages per day, by which operation the corresponding tabulated surface will be brought behind the slides *c*, and the required result may be disclosed in the same manner as above described. The mechanism for producing these movements is precisely similar to that already described. In this arrangement two dials *m*, are used instead of one, and the slides *c*, are elongated, in order to be worked, as just described, in connection with either dial; the object being to increase the number of multiplicands capable of being operated upon in the same machine, without inconveniently increasing the diameter of the roller containing the tabulated surfaces.

This improved ready-reckoning machine may also be employed for reckoning foreign exchanges; as, for example, the exchange between London upon Paris. In this case the number or factor which has been called the multiplicand is marked on the dial *m*, and indicates the course of exchange of London upon Paris, in all its presumable variations, from the rate of 25 francs up to that of 26 francs, in amounts of 2½ centimes each; and the number or factor which has been called the multiplier is contained in the series of numbers, in units, tens, &c., of pounds, shillings, and pence, shewn on the buttons of the slides *c*, and face-plate *b*, and intended to represent the sums to be exchanged. In operating with the machine, the index-handle *n*, is turned to the given rate of exchange marked on the dial, when the required result may be ascertained by withdrawing the proper slides, as above described. The following example will make the mode of indicating the exchange more evident:—Let £2645. 12*s.* 3*d.* be the sum required to be exchanged at Paris, and the rate of exchange be 25 francs 47½ centimes for one pound sterling. In order to effect the reckoning, it is necessary, in the first place, to point the index *n*, to that rate of exchange (that is to say), to place it over that division of the dial which indicates 25. 47½. The table relating thereto, with all the results of that exchange calculated beforehand for the whole scale of the machine in units, tens, &c., of pounds, shillings, and pence, is, by such operation, placed simultaneously behind the slides *c*, so that it only remains to push the several buttons *e*, *e*, representing together the aforesaid sum of £2645. 12*s.* 3*d.*, in order to bring to view immediately all the results required, series by series; viz., that of—

		FRANCS.	CENTS.	MILLIÈMES.
£2000	producing	50,950		
600	„	15,285		
40	„	1,019		
5	„	127	37	5
10^s	„	12	73	75
2^s	„	2	54	75
3^d	„		31	844
		67,396	97	844

which separate items, added together, produce the general result, which amounts to the sum of francs 67,396 : 97 : 844, equal to that which would be obtained by multiplying together, by the usual process, £2645. 12*s.* 3*d.* and 25 francs 47½ centimes.

The mechanism for producing the said movements in this machine may be similar to that already described; the diameter of the roller containing the tabulated surfaces being suitably increased, in order to include the greater number of tables upon it.

A modification of the ready-reckoning machine may also be employed for reckoning interest on different sums of money the number or factor answering to that which has been called the multiplicand may include both the rate per cent. and also the time of interest; and the number or factor which has been called the multiplier will be contained in the units, tens, &c., of pounds, shillings, and pence, on the buttons *e*, and face-plate *b*, as before. The machine may be employed to ascertain the amount of interest at 1, 2, 3, 4, 5, 6, &c., per cent., or with as many subdivisions of rates as may be desired, and for such or such number of days to run, or days of interest. In order to make use of this machine, it is sufficient to prepare beforehand the tables comprising the results of all these different rates of interest, calculated always for the whole extent or range of the machine in units, tens, hundreds, thousands, &c.;—to print or mark those tables upon paper or other substance, so as to adapt them to the mechanism employed;—and to have the machines furnished with dials, indicating as many days as may be desired; for instance, one dial indicating from 1 to 30 days, a second from 31 to 60 days, a third from 61 to 90 days, and so on successively and inclusively. To obtain the results classified in a tabular form, corresponding to such or such number of days, and according to the given rate of interest, it is only necessary to place the index *n*, upon the division of the dial indicating the given number of days, in order to place simultaneously behind the slides the table relating thereto; and so soon as it is thus placed, the only remaining operation to perform is to push the several buttons *e*, representing the principal of which the interest is required to be ascertained, in order to cause all the results sought for immediately to appear, always series by series, viz. by units, tens, hundreds, thousands, &c.—These respective items added together form the result required.

The patentee, in conclusion, remarks that he does not claim the exclusive use of the slides and face-plate represented and described, except when such slides and face-plate are used in combination with a commercial table or ready reckoner for the purposes of the said invention; but what he claims is a ready-reckoning machine, constructed and arranged so that commercial tables or ready reckoners may be used and read for the purposes for which they are intended, by bringing into view, by a simple mechanical operation, such of the symbols or numbers only as are necessary for, or form part of, the particular calculation or result to be ascertained, the rest of the numbers on the table being at the same time concealed from view.—[*Inrolled in the Rolls Chapel Office, January,* 1848.]

To NATHANIEL CARD, *of Manchester, in the county of Lancaster, twine manufacturer, for certain improvements in machinery or apparatus for twisting, twining, or manufacturing cords, bands, twine, and other similar articles, from cotton, flax, hemp, silk, and other fibrous yarns or threads.*—[Sealed 16th February, 1847.]

THESE improvements in machinery or apparatus for twisting, twining, or manufacturing cords, bands, twine, and other similar articles, from cotton, flax, hemp, silk, and other fibrous yarns or threads, apply only to the manufacture of such cords, bands, &c., as are made by twisting, turning, or doubling two or more threads or strands together; and consist, firstly, in the employment of a bobbin, with catches, and a hollow spindle, and a weight or spring, or other elastic medium (hereinafter more particularly described), which bears upon the yarn or thread, so as to keep each strand or thread at an equal tension whilst twisting them, either previous to their being twined or doubled together into a cord or band, &c., or during that operation, either in the ordinary doubling or other twisting-frame, or on the rope and twine-walk; secondly, the invention consists in substituting the above-mentioned bobbins, spindles, and weights or springs, for the creel, in the ordinary or other twisting or winding-frames; and thirdly, in the application of a hollow spindle and a weight or spring, or other elastic medium, in connection with a catch-wheel, to be used in conjunction with the ordinary bobbins in the common twisting, doubling, or winding-machines, or upon the rope and twine-walk, for the purpose of keeping each thread or strand at an equal tension, either previous to or whilst twisting them together into a cord or band.

In Plate XII., fig. 1, shews a sectional elevation of the improved spindle and bobbin, as applied to the ordinary twisting or doubling-frame, for the purpose of twisting the yarns or threads, and keeping them at an equal tension previous to or during the process of their being twined or doubled together into a cord or band by the front or twisting-spindles of the doubling or twisting-frame. *a, a,* is the hollow spindle, and *b, b,* the flyer, one arm of which is furnished with a small lever *c; d, d,* is the bobbin, to which is attached a small catch-plate *e, e,* having projections or teeth upon its surface; *f, f,* is a tension-weight, placed in the interior of the spindle *a,* and supported or suspended therein by the thread or yarn; *g,* is a pin, working in an upright slot or opening in the hollow spindle, which pin prevents the tension-weight *f,* from falling too low, and also serves as a handle wherewith to raise the said weight when necessary. The thread or yarn passes from the bobbin *d, d,* through two eyes in the flyer *b, b,*—thence through the eye in the end of the lever *c,* to the tension-weight *f, f;* and, after passing through the eye of the said weight, and thus supporting it, is brought upwards through the opening in the top of the spindle, whence it passes off through the rollers to be doubled or twisted together by the front spindles of the machine. The weight *f, f,* should be sufficiently heavy to cause the tension of the yarn or thread to turn the bobbin. The spindle *a,* is caused to revolve, so as to give the requisite amount of twist to the yarn or thread by means of the bevil-wheel *h.* So long as the strands remain at the requisite tension, the weight *f, f,* and lever *c,* will remain in the position shewn in the drawing; but when any one of the strands becomes slack, its corresponding weight will fall—and allow the lever *c,* to fall into the catches or teeth *e, e,* upon its bobbin, and thus stop that bobbin from giving out more yarn, until the tension of the yarn, raising the weight *f, f,* lifts the lever *c,* and thus releases the bobbin. By connecting the pin *g,* to the strap-fork or guide, in any convenient manner, the falling of the tension-weight *f, f,* may be made to stop the machine. In twisting or doubling by means of the ordinary revolving plates, or the "sun and planet gearing," the spindles (being driven by pinions placed almost immediately below the flyer) are not required to be so long, and the weight *f*, may be so placed, that when a thread breaks, its tension weight *f*, shall fall, and project below the end of the spindle, which projection may be caused, by various contrivances, also to stop the machine. The same spindle and bobbin may be used in the rope or twine-walk, for the purpose of keeping the yarn or warp at an equal tension, whilst "warping out." The same spindle and bobbin may also be used instead of, or in the place of, the creel generally employed in the ordinary twisting or doubling frames, to deliver the strands with an equal tension to the rollers, previous to their being twisted together into a cord or band. It may be also applied for the purpose of winding yarn from one bobbin to another, in which case the spindle is not required to revolve, but may remain stationary; or the creel and common bobbins may be employed, the strands of yarn being kept at an equal tension by passing through a modification of the above apparatus, which is shewn in elevation at fig. 2, and in section at fig. 3. The thread passes through the eye of the guide *a, a,* over the grooved-pulley *b,* through the eye in the catch-lever *c, c,* and, after passing through the eye of the tension-weight *d, d,* is brought upwards through the top of the hollow spindle *e, e.* When the yarn becomes slack, and the tension-weight *d, d,* falls, the upper end of the lever *c, c,* catches against the pins on the pulley *b,* and prevents it revolving; the teeth in the groove holding the yarn or thread until the tension-weight *d, d,* rises. The patentee remarks, that a spiral or other spring may be employed, in place of the weight above described.

The patentee claims the application or employment of the above-described spindles and bobbins to or in twisting or doubling frames, or whilst winding yarns or threads upon the rope and twine-walk, for the purpose of twisting the strands or threads, and holding them at an equal tension previous to or during the operation of twisting or doubling them together or manufacturing them into a twisted cord, band, &c. And also the application of the apparatus shewn in figs. 2, and 3, or any modification thereof, in the manner and to the purpose above particularly set forth.—[*Inrolled in the Petty Bag Office, August,* 1848.]

To William Edward Newton, *of the Office for Patents, 66, Chancery-lane, in the county of Middlesex, civil engineer, for improvements in the mode or modes of manufacturing or preparing certain matters to be employed as pigments,—being a communication.*—[Sealed 16th November, 1847.]

The substances which, under this invention, it is proposed to manufacture or prepare as pigments, are the following:—1st, zinc-white; 2nd, zinc-yellow; and 3rd, zinc-green. The manufacture of the zinc-white is effected by distilling the metal from the mineral, or from the oxide, by means of the arrangement of furnaces and apparatus shewn in Plate XII. Fig. 1, represents a plan view; and fig. 2, a longitudinal section of a glass furnace, with certain modifications, as will be hereafter explained, and with all the appendages and additional parts necessary for manufacturing and collecting the zinc-white. A, is the door of the furnace; B, the fireplace; C, C, are retorts, made of refractory clay or other suitable material, capable of resisting a high temperature (they are five in number, but this number may be varied, either by increasing or diminishing it); and D, D, are the openings or mouths of the retorts, whereby the products of distillation escape therefrom. E, E, E, are rods or bars of iron or other metal, suspended from above, as shewn best in fig. 2, and they are adapted to the mouths or openings of the retorts in such a manner that, by causing them to move laterally in front thereof, they may scrape off such of the products of distillation as may adhere to the mouths of the retorts, and which would otherwise obstruct the opening. These rods or bars are termed "scrapers," because they are intended to scrape away and remove the adherent matter from the openings of each retort. F, is a horizontal bar, to which all the scrapers are attached, so that by moving this bar backwards and forwards in a lateral direction, each of the scrapers will be made to act in a similar manner, and thus scrape the orifices of each retort. This bar F, may be worked either by hand or by any suitable mechanical means. G, G, are hoppers, for receiving the heavy masses of calcined zinc:

these hoppers are disposed in such a manner below the opening or mouth of the retorts that their lower ends may, by means of short pipes, terminate in a general or common channel G^1, and from thence the product is carried down into a receptacle G^2. It should be understood that these channels are only intended to receive the solid matters which escape during distillation, or that portion of the product which accumulates near the orifice or mouth of the retort, and is too heavy a body to be drawn by exhaustion towards the oxidizing chamber. H, is a small iron chamber, applied to each retort, for the purpose of isolating them from one another; it is placed upon a framing H^1, and is fixed to the wall; but it may be so arranged as to admit of its being removed at pleasure, either by means of a crane, or by causing it to roll on a framing or railway, or by other suitable contrivances. The front part of these chambers is open, and is placed opposite the orifice or mouth of the retorts, so that the products of distillation may issue from the retorts into this chamber. In the plan view some of these chambers are shewn as removed, and others in their proper places. The back part of these chambers may be made to open or shut at pleasure. J, is a trap or opening made in the floor K, and closed by a door, which, being hinged at one end, may be raised and lowered by means of an iron chain or rod I, passed across the back part of the chamber, so that the trap-door may be raised or lowered without the necessity of opening the chamber H. The operation of opening or closing the trap may, however, be accomplished in any other convenient manner.

The arrangements shewn at H, I, J, may be adapted to furnaces for treating zinc, in which a certain part of the oxide that is formed is always lost, and which might be collected, either by the above-described method, or by closing, by means of a cloth, the space beneath the vessel, where the zinc will be deposited. If the iron chamber is employed, a small opening may be made in the part I, which may be opened and closed at pleasure, and a glass may be placed therein, in order to enable the attendant to watch the operations that go on in the chamber, and the manner in which the distillation process proceeds. In place of the constructions and arrangements above mentioned, the same object may be effected by fixing a vertical plate on each side of the orifice or mouth of the retort, and adapting a third plate, which should serve as a cover, and be capable of being raised or lowered at will between the two side plates. K, is a flooring, upon which the chambers H, are placed, and which separates this part of the apparatus from the oxidizing chamber. Currents of cold air may be directed either into the chamber of which the part K, forms the floor, and in which the retorts are worked, or into the floor itself, which is made hollow for this purpose; so that by a continual current of cold air passing through the floor, the temperature of the upper chamber may be kept down and rendered supportable. L, is a pipe for the supply of hot air; it communicates with the pipes of the hoppers G, G, from which it drives out the white product, and sends it into the oxidizing chamber. Instead of a current of hot air, a current of cold air may be made to pass across the chamber H; or, if thought desirable, the hot and cold air may be used in combination. M, is what is called the oxidizing chamber, because the metallic vapour is there oxidized, upon leaving the retort, by its contact with the atmospheric air. N, is a part of the oxidizing and collecting chamber, in which are arranged cloths or woven fabrics for sifting the products. It consists of a series of hoppers or inclined planes, upon which the products, as they form, become deposited, and, by their own weight, slide down into receptacles placed in a chamber below. These hoppers are furnished with valves, cocks, or registers, for the purpose of opening or closing, at pleasure, the passage for the products. The whole of the products may be collected without loss, by means of suitable vessels or receivers, filled with water, and furnished with two pipes. One of these pipes communicates with the oxidizing chamber, in which the zinc-white is produced, and its other end is inserted in the water of the vessel, and conducts the zinc-white thereto, from the oxidizing chamber; the end of the other pipe does not enter the water, but, by withdrawing air from the vessel, a vacuum is produced in the first pipe, which enters the water, and the products are drawn down into the water, and are deposited therein. O, are receptacles for the white product. P, P, are partitions of metallic cloth or woven fabric, placed at suitable distances apart, for the purpose of allowing the passage of the atmospheric air, but of retaining and sifting the products. Q, is an exhausting-tube, for the purpose of drawing air through the sifting surfaces, and drawing the products, as they are formed, towards the oxidizing and collecting chambers. It should be understood that the same effect may be produced in other ways, either by exhaustion, or forcing air, by means of fans or air-pumps, or other blowing machines. R, is a tube, placed above the mouth or opening of each retort; it is furnished with a funnel-shaped mouth, through which the volatilized products that escape from the retorts are drawn, while the retorts are being charged, and their ordinary communication through the trap with the oxidizing chamber is cut off,—the trap-door J, being down. The tube R, conducts the volatilized products by another channel to the oxidizing chamber and sifting partitions; or they may be made to pass through other sifting partitions, arranged expressly for the purpose, in connection with the tube R. The exhaustion may be effected by any suitable means, such as by heating the tube or by means of fans. The tube R, is closed whilst the retorts are in operation, and the products are passing at once into the oxidizing chamber. In the example here given the exhaustion is produced by means of the waste heat from the furnace.

The preceding arrangements have for their principal object the separation of the retorts from each other, and it will be understood that this object may be attained by other analogous means; for instance, the flooring K, might be so arranged as to be capable of being raised or lowered at pleasure, so as to separate the retorts from one another, if requisite. It might also be divided into sections, corresponding to the number of retorts, so that that part only of the floor which is required to be insulated from, or put into communication with, the oxidizing chamber, may be raised or lowered.

The retorts might be separated from each other by means of partitions, so as to render them independent of each other. The pipe R, might also be of such dimensions and exhausting power as to draw in all the products as they are formed. From thence they are carried directly to the collecting chambers.

Fig. 3, represents, in longitudinal section, a blast furnace, adapted to the same operation. It must be closed at top, either by a cover, which may be moveable, for the purpose of charging the retorts, or by a hopper, in which the substances to be operated upon may be placed. Or it might be hermetically closed at the top, and have an opening at one side for the purpose of charging; which opening, after the retorts have been charged, should be closed. Or the substances might be supplied through the opening B. An opening must in that case be made in the required direction to receive an inclined plane, upon which the substances to be supplied to the furnace are to be poured.

In this figure A, is an ordinary blast furnace, which may be made of any suitable dimensions. B, is an opening, through which the products pass into the oxidizing chamber. C, is the oxidizing chamber, arranged in the same manner as that before described. Between each hopper in the oxidizing chamber, metallic or other sifting partitions are placed, for the purpose of arresting the heaviest portions of the products and any extraneous matters or impurities which may escape through the orifice B. These sifting partitions will allow of the passage of the zinc-white only by reason of its lightness and tenuity. The opening B, may be provided with a register, or any other suitable contrivance, for the purpose of separating the oxidizing chamber from the furnace, and cutting off the communication between them when requisite, either whilst charging or under any other circumstances. The openings for charging might be so arranged as to supply the materials in small quantities, as the distillation goes on, either by means of a hopper, or any other known contrivance. A current of air, independently of that driven from the blower for the purpose of aiding the combustion, might be so regulated as to provide the metallic vapor with the quantity of oxygen necessary for the formation of the zinc-white. This current of air may either be conducted directly into the furnace or into the opening B. Or this object might be effected by means of exhaustion, or by forcing air through a pipe, leading to the furnace or the oxidizing chamber.

The furnace may be of a circular form, or horizontal, or more or less inclined. Instead of one opening B, a greater number might be employed; and, instead of placing them at the upper part, they might be set at different heights, even as high as the fireplace, in which case the products formed would be carried direct to the oxidizing chamber, without being obliged to pass through the substances above. A reverberatory furnace, or a furnace similar to those employed for making coke, might be adapted to the above purpose.

Fig. 4, represents a transverse vertical section, and fig. 5, a longitudinal vertical section of a novel construction of furnace for manufacturing zinc-white. This furnace resembles, in form, two long horizontal tubes, set side by side; and in it fireplaces (which are fed with blasts of air) are constructed at convenient distances. A, A, are tubular chambers, constructed of fire-bricks or other substances capable of resisting a considerable degree of heat; B, are flues, through which the air (either hot or cold) may be driven by means of a blower; and C, is the lowest part of the furnace, in which the residual matters of the combustion accumulate, and may be removed, from time to time, by any suitable opening. The part C, is continued downwards, as shewn at J, J, so as to form a kind of ash-pit; and the ashes are removed through an opening made for that purpose. The parts C, and J, are divided by fire-bars or a register, which may be opened at will to allow the ashes to fall into the space beneath; or, instead of a register, it might be closed by a grating of such a size as to retain the ore and allow the scoria only to escape through the bars into the ash-pit. By this arrangement a current of air might be conducted up between the bars, and the blowing-machine might thus be dispensed with. It would be advisable to mix some appropriate flux with the matters when introduced into the furnace, in order to reduce the scoria to a liquid state, and allow it to run out through an opening made for the purpose in the part C. D, D, D, are the fireplaces, which communicate with each other by the horizontal chamber or arch F, above;—the charge of ore and coke is piled up until it is flush with the top of the brickwork at *a*, leaving the upper part F, empty. E, E, are partitions of fire-brick, separating the fireplaces D, D, from each other below. A current of air may be forced or drawn through the upper part F, F, for the purpose of conducting the volatile products to the collecting chambers, and of oxidizing the metallic vapours which are evolved during combustion. At each end of the flue F, collecting chambers are situated, into which the products pass through passages G, G: these passages G, G, are furnished with registers, which may be opened or closed as occasion may require. H, H, are the collecting chambers for receiving the zinc-white when formed: they are arranged in the same manner as those above described. Instead of two chambers, one only might be employed, if found more convenient. I, I, I, are openings for charging, directly over the fireplaces, and which must be hermetically closed after each charging operation, either by luting or by means of a hopper, in which the substances to be operated upon may be previously dried, or by any other suitable means.

It will be easily understood that various modifications may be made in this apparatus; for instance, instead of two tubes, a greater number or one only might be employed; the number and dimensions of the fireplaces might be varied, or the brickwork might be carried higher up, so as to leave a smaller space for the passage of the air and the products; or one collecting-chamber only instead of two might be employed, without departing from the nature of this part of the invention, which consists in the employment of a horizontal tubular furnace, containing one or more fire places (working either with or without blasts of air), and communicating with chambers into which the products of combustion are driven or drawn.

The following is the mode of operation:—1st. When retorts are employed, the zinc is introduced in the form of ingots into the retorts, previously heated to a white heat; and when they are completely charged, the trap-door in the flooring is to be raised (after having closed the door of the external chamber H), so as to put the retort in direct communication with the oxidizing chamber. The zinc passes off in the state of vapour, becomes oxidized by the air from the air-pipe, and is drawn into the chamber by the exhaustion which is constantly maintained by means of the pipe R; it is there arrested by the wire-gauze partition (which, however, allows the air to pass) and deposited in hoppers, from which it drops into receptacles placed below. When the retort is exhausted, the trap-door in the flooring is lowered, the retort is re-charged, and the operation proceeds as before. If zinc ore or oxide of zinc be operated upon, it is mixed with half its weight of coal, coke, or earth, in the ordinary manner of treating zinc ore. If uncalcined blende (native sulphuret of zinc) be operated upon, it is necessary to add to the mixture a quantity of peroxide of manganese, carbonate of lime, or oxide of iron, proportioned to the quantity of sulphur it contains.

2nd. In operating by means of a blast-furnace. The furnace is to be charged with the ore, mixed with the substances above mentioned, and also with a sufficient quantity of flux suitable to the nature of the scoria. As the zinc separates from the other substances with which it was combined, it passes off in the state of metallic vapour, which becomes oxidized, and is driven or drawn into the oxidizing chambers, and collected as above described.

3rd. When employing reverberatory furnaces, or those similar to coke ovens.—The working of a reverberatory furnace is so well known, that it is unnecessary here to describe it; the charging and cleansing is conducted in the same manner as when operating upon other ores: this method is not, however, so convenient as the others.

When furnaces like those employed for making coke are employed, it is only necessary to charge them, when heated to a high temperature, with the metal or oxide of zinc, either alone or mixed with coal or with ore, through the ordinary door, or through an opening above, or at the side. A current of air must be passed, either through the furnace, or to the orifice of the pipes leading to the collecting chamber, in order to convert the metallic vapour into oxide of zinc or zinc-white. In operating upon the metal with this or an analogous form of apparatus, the melted zinc might be allowed to fall in drops, like rain, by means of a sieve above.

4th. In operating with the horizontal tubular furnace. The furnace is heated to a suitable temperature by means of coal or coke; the mixture of ore and coke or coal is then fed in through the openings I, I, to which may be added (according to the arrangement) a certain quantity of flux, such as alumina and carbonate of lime, or other substance, according to the nature of the scoria or residuary matters,—care being taken to leave the upper part F, free. In treating uncalcined blende, a certain quantity of carbonate of lime, peroxide of manganese, or oxide of iron, must be mixed with it, according to the quantity of sulphur it contains. The ore is decomposed, and the zinc goes off in the state of metallic vapour, which combines with the oxygen, and forms oxide of zinc, which passes into the collecting chambers, towards which it is continually driven or drawn, as above mentioned. Immediately after charging, and until the charge has become incandescent, gases and solid although light bodies will be given off, which may find their way into the collecting chamber, and would spoil the whiteness of the products. It is to remedy this that two chambers are employed, one at each end. One of these chambers is intended to receive the products which escape before the charge has become incandescent; and therefore, immediately after charging, the register of the chamber intended to receive the most pure products is closed, whilst that for the reception of the impure vapours is left open. This latter is closed when pure zinc-white begins to be formed, and the other one is opened. The collecting chambers, and all the other parts, are arranged as above described.

An arrangement of furnace, constructed upon the same principle as those ordinarily employed for the manufacture of coal-gas, is shewn at figs. 6, and 7, as adapted to the manufacture of zinc-white, with the oxidizing chamber and its accessories; fig. 6, being a plan view, and fig. 7, a longitudinal vertical section of the same.

Any number of these furnaces might be placed side by side, and furnished respectively with any suitable number of retorts. In these figures similar letters indicate corresponding parts in the former figures; the principal difference in construction being, that in this arrangement the retort may be charged through the chamber in which the fireplace is situated. For this purpose the retort is open at both the ends D, and D^1; it is charged at the end D^1, which is afterwards hermetically closed, and remains so during the process of distillation. In adopting this arrangement, the chamber H, and flooring K, may be dispensed with.

The patentee claims, First,—the distillation of metallic zinc, or of oxide of zinc, or zinc-ore, by any of the means above mentioned. Secondly,—the application of furnaces, similar to glass furnaces, reverberatory furnaces, and coke ovens, as above described, and the modifications of them respectively, in order to fit them for the purpose of manufacturing zinc-white. Thirdly,—the novel construction of furnace for this purpose above described and shewn at figs. 4, and 5, of the drawings. Fourthly,—isolating the retorts, and also cutting off the communication between the retorts and the oxidizing chamber when required, whatever means may be employed to effect that object. Fifthly,—the employment of suitable apparatus for cleansing the mouths of the retorts, without being obliged to enter the oxidizing chamber. Sixthly,—the arrangement of apparatus shewn and described, or any modification thereof, by which the retorts may be charged, cleaned, and replaced, or submitted to any operation required, without interfering with the oxidizing chamber. Seventhly,—the application or employment of blast furnaces for the production or manufacture of zinc-white or oxide of zinc, whether such furnaces be circular or of any other suitable form, and whether they be constructed and arranged in a vertical, inclined, or horizontal position. Eighthly,—the introduction of currents of air to an oxidizing or other chamber, for the purpose of converting the metallic vapours of zinc into zinc-white or oxide of zinc; also the employment of an exhausting tube or blowing apparatus for conducting the metallic vapours to the oxidizing chamber, as above shewn and described. He claims also the employment of wire gauze or sieves for sifting the products; also the arrangement of vessels for receiving the heaviest portion of the products. Ninthly,—the arrangement of the oxidizing chambers, so as to allow of the products being collected from them without the necessity of entering the said chambers.

As respects the preparation of zinc-yellow and zinc-green, the patentee remarks, that in the manufacture of zinc-yellow (the process for effecting which forms the subject of a previous patent) hydrochloric acid may be used instead of sulphuric acid; and further,—to obtain zinc-green yellow, produced by the patented process, is diluted with a suitable quantity of water, and mixed with a certain quantity of Prussian blue (previously mixed with a suitable quantity of water, oil, or other appropriate liquid), either in a hot or cold state. Green of zinc will thus be formed, the color of which will be as durable as the blue itself.

The above substances may be employed for painting of any kind, or for any other purposes for which white lead or other pigments are usually employed.—[*Inrolled in the Rolls Chapel Office, May,* 1848.]

To THOMAS ROBERT SEWELL, *of Carrington, in the parish of Basford, in the county of Nottingham, chemist, for improvements in preparing flour.*—[Sealed 18th January, 1848.]

THE object of this invention is to produce certain marketable preparations of flour, which will admit of being kept or transported from place to place, for several weeks, without deterioration in their quality, and subsequently of being made into bread without the use of yeast.

It is known to chemists that hydrochloric acid contains one equivalent of hydrogen, combined with one equivalent of chlorine; and that bicarbonate of soda contains one equivalent of sodium and one equivalent of oxygen (forming soda), combined with two equivalents of carbonic acid. When hydrochloric acid is added to bicarbonate of soda, the play of affinities effects a mutual decomposition; the chlorine combines with the sodium to produce common salt, and the hydrogen with the oxygen to produce water,—carbonic acid gas being liberated. If these actions be permitted to take place in the midst of a mass of dough, and under favorable circumstances, the effect is to render it light or spongy. But these ingredients, when heretofore employed to lighten dough, have been used in such a state, and in such a manner, that, to secure a favorable result, no time could be allowed to elapse between the mixing and making them into articles of food: consequently each individual intending to employ them has been under the necessity of procuring the ingredients separately,—thereby risking the difference of strength and quality, besides the great inconvenience arising from mistakes in weighing and measuring,—on every occasion on which even the smallest quantities were to be used.

It is well known that the flour which is employed as human food, whatever may be the grain it is obtained from, contains a considerable quantity of fecula or starch, which, in its perfect state, consists of minute elastic vesicles, filled with a fluid, which is the stiffening principle of starch. Now the patentee has found, by experiment, that hydrochloric acid, which has a powerful affinity for moisture, is, when brought into contact with these molecules of fecula, immediately absorbed by them, and retained in a chemically inactive state, until required to be brought into action for the purposes of the invention.

In consequence of these ingredients possessing the properties above described, the patentee states that he is enabled to produce certain marketable preparations of flour, which will admit of being kept or transported from place to place for several weeks, and subsequently of being made into bread without the use of yeast. To attain this end he proceeds in the following manner:—Of good dry flour he takes 280 lbs. avoirdupois weight, and places it in a tub or circular vessel, similar to that shewn in plan view and vertical section at figs. 1, and 2, in Plate XI. This tub is provided with a central shaft A, which carries a boss, having two curved arms or sweeps B, and C, attached to its periphery; and when the shaft is rotated by any first mover, these arms will effectually disturb the flour, and continually present a fresh surface, in the manner and for the purpose to be presently described. Between the sweep B, and the boss is an opening or free passage for the flour; and, at the outer end, this sweep is formed by a flexible substance, such as sheet-iron, which, from its curvature, will have a tendency to keep in contact with the inner periphery of the tub or circular vessel, and thus, as it rotates, drive or sweep the flour forwards. The sweep C, which is shorter than the sweep B, is in immediate connection with its boss, and is intended, by its rotation, to drive the flour from the centre of the vessel, that it may come in contact with the sweep B; when, therefore, the apparatus is put in motion, the flour will be continually receding from and returning towards the centre of the vessel, and thus a fresh surface will be exposed: the depth of the sweeps should always be less than that of the flour in the tub. Immediately above the shaft A, a glass vessel D, is suspended from a vertical glass tube, pendent from a reservoir E, which is supported in any convenient way. This reservoir is intended to contain the hydrochloric acid which is to be incorporated with the flour. At the lower part of the vessel D, a series of radial tubes, communicating with the interior of that vessel, is provided. The diameter of these tubes is preferred to be about one-eighth of an inch, and their outer ends are made conical, in order to reduce the bore to about one-hundredth part of an inch, and approximate them to a point. An amount of acid is poured into the reservoir E, sufficient to produce the required pressure on the acid, which is to be given off and become incorporated with the flour, and also to supply that amount of acid. Before thus charging the reservoir E, the flour is put in motion, and, while actuated, the acid will, by its own gravity, fall upon the changing surface of the flour in the form of a light spray. But, in order effectually to prevent the falling of drops of the acid (if such should accumulate upon the under surface of the vessel D), a dish F, is placed above the shaft A, and immediately under the vessel D, to receive such droppings of the acid, and prevent them from falling into and coagulating the flour. The amount of hydrochloric acid which is thus combined with the flour is about forty-five ounces, avoirdupois weight, of the specific gravity 1.14, which contains about 28 per cent. of real acid. When the proper quantity of acid has fallen, the remainder is removed by inverting the vessels D, and E; and when the acid is thoroughly incorporated with the flour, the slide G, of the tub is drawn up, and the continued rotation of the sweeps will force the flour down the shute H, into a proper receptacle, where it is collected, and afterwards sifted through a fine sieve, put into flour-barrels or other receivers, and is ready for sale. Thus a preparation of flour is produced, ready to be combined with other ingredients, hereinafter mentioned, which will render it suitable to be made into bread without the use of yeast.

The flour prepared as above the inventor terms the preparation No. 1, because it admits of being kept for a longer period before it is used than the preparation No 2, which will now be described.

In order to produce preparation No. 2, take of good dry flour 280 lbs., avoirdupois weight, and pursue the same course of operations with it as is adopted in producing preparation No. 1, up to the point at which the hydrochloric acid is thoroughly incorporated with the flour, as before described; but, instead of stopping the agitation at that point, continue it until there is sifted into, and thoroughly incorporated with, the mixture of flour and hydrochloric acid about 39 ozs., avoirdupois weight, of bicarbonate of soda, in a state of fine powder; at which stage any other ingredients known to improve the appearance and flavour of bread may also be added, (when such addition is thought desirable,) according to the taste of the consumer. When the mixture is completed, the whole is passed through a fine sieve, put into flour-barrels or other receptacles, and is ready for sale or use.

To make preparation No. 1, into bread (which should be done within about five weeks from the time it is produced), all that is required is to mix intimately with each pound weight to be used 63 grains of bicarbonate of soda, in a state of fine powder, in which state also may be added (according to the taste of the consumer) a portion of culinary salt, sugar, or any other ingredient known to improve the appearance and flavor of bread. After the mixture is completed, it must be kneaded well and actively with cold water; it may then be put into the oven, either immediately, or, if kept cold, any time within an hour or two.

To make preparation No. 2, into bread, (which should be done within about 4 weeks from the time it is produced,) all that is requisite is to knead it well and actively with cold water; it may then be put into the oven, either immediately, or, if kept cold, at any time within an hour or two.

The quantities, proportions, and states of the ingredients, and the dimensions of the apparatus employed, admit of being varied within certain limits without seriously affecting the results. The patentee does not therefore confine himself to the use of them in the exact quantities, proportions, states, and dimensions above specified, although they are such as by experience he has found to answer best.

The patentee claims the exclusive right to unite hydrochloric acid with dressed or undressed flour, in such quantities, proportions, and states, as to produce the marketable preparation of flour hereinbefore described as preparation No. 1; and he claims the exclusive right to unite hydrochloric acid and bicarbonate of soda with dressed or undressed flour, in such quantities, proportions, and states, as to produce the marketable preparation of flour hereinbefore described as preparation No. 2. He further claims the mode of effecting the intimate mixture of the hydrochloric acid with the flour, as above described.—[*Inrolled in the Petty Bag Office, July,* 1848.]

To Edward Waud, *of Bradford, in the county of York, spinner, for certain improvements in the construction of machinery for preparing and spinning alpaca, mohair, wool, flax, and other fibrous materials.*—[Sealed 9th November, 1847.]

This invention relates to certain modifications of screw-gill machinery, by which the fibres of the material are opened, drawn, and refined. The improvements are effected by the employment of conducting screws of different threads, which lead on the heckle-bars at different degrees of speed, suited to the necessary opening and draft of the long and short fibres of the material between the back holding and front drawing-rollers; by which means a more equal and uniform slubbing, roving, or yarn may be produced than is ordinarily obtained, by the frequent slipping of long and short fibres being avoided.

In Plate XI., fig. 1, is a horizontal view of a screw-gill machine; fig. 2, is a side elevation of the same; and fig. 3, is a section (on a somewhat enlarged scale), taken vertically through the machine, the operating parts on one side being there exposed to view. The material having been previously carded, combed, or heckled, by any of the ordinary means, is introduced into this machine, in the form of carding-sliver or slubbing, between the bottom and top retaining-rollers *a*, *a*, and *b*, and thence passes onward to the bottom and top drawing-rollers *c*, *c*, and *d*; in which progress the material is intercepted by three series of heckle-bars *e*, *f*, and *g*. These several series of heckle-bars are made to travel onward at different speeds by the rotary motion of the screw-shafts; each series of heckle-bars being conducted by distinct screws or worms on the upper longitudinal shafts *l*, which worms have threads or grooves formed at different degrees of obliquity, as shewn at *h*, *i*, and *k*. As each heckle-bar of the several series arrives at the forward end of its range it is made to descend into the screws or worms below, on the longitudinal shafts *m*, by means of wipers *n*, on the longitudinal shaft *l*, see the detached view, fig. 4, which is a section taken transversely through the machine. The screws on the shaft *m*, below, are of a coarser rake than the conducting-screws above (as may be seen in the figures), in order that the heckle-bars may be conducted back again with a greater speed than that at which they advanced; and when the heckle-bars severally arrive at the back end of their range, they are raised into the upper worms by wipers *p*, (see fig. 4,) attached, for that purpose, to the longitudinal shafts *m*, as usual.

The patentee remarks, that he does not intend to confine himself to the precise construction and arrangement shewn in the gill machine, represented in the drawings, as the same improvements may be adapted to other machinery in which heckle-bars or gill-bars are employed for opening and drawing the fibres of flax, wool, and other materials; neither does he limit himself to the use of the precise number of dissimilar worms or screws for conducting the heckle-bars shewn in the drawings, as, under some circumstances, he may find two series of heckle-bars or gills sufficient for opening and drawing the fibres of the material in connection with the operations of slubbing, roving, and spinning; or, in working some materials, he may find it desirable to use more than three series of heckle-bars or gills; he therefore wishes it to be understood that his invention consists in the adaptation to and employment in one machine of several screws or worms, having dissimilar threads, whereby distinct series of heckle-bars or gills may be made to move with different speeds between drawing-rollers, for the purpose of more effectually opening, drawing, and equalizing the long and short fibres of flax, wool, alpaca, mohair, and other fibrous substances, whether such machines are employed for preparing or spinning those materials.—[*Inrolled in the Petty Bag Office, May*, 1848.]

To George James Soward, *of Huntley-street, Bedford-square, Middlesex, builder, for improvements in suspending window-sashes, shutters, and blinds, and in the construction of the frames for the same,—being a communication.* [Sealed 11th November, 1847.]

This invention consists in certain methods of hanging or suspending window-sashes, shutters, and blinds, by means of bands or cords of vulcanized India-rubber, and by means of bands or cords of vulcanized India-rubber, gutta-percha, or other substance, in combination with the ordinary box-spring; and also in a mode of suspending the blinds or windows of carriages by the above means.

In Plate XI., fig. 1, is a front view of portions of two sashes, and the frame containing the same; fig. 2, is a side or edge view of the frame; and fig. 3, is an edge view of the two sashes. To the upper part of the lower sash *a*, at each side, is attached the end b^1, of a band or cord *b*, of vulcanized India-rubber, by means of a metal plate, screwed to the sash;

the band or cord is then passed around the roller *c*, (attached to the sash,) and carried upwards to the top of the frame *d*, where its other end b^2, is secured;—a suitable groove or recess is made in the edge of the sash to receive the band or cord. The upper sash *e*, is suspended in a similar manner, by means of the band or cord *f*. *g*, *g*, are spring-pieces, attached to the frame *d*, the pins of which are pressed by springs of metal or vulcanized India-rubber against the edge or edges of the sashes, for the purpose of retaining the same at any required degree of elevation; they may be provided with buttons *h*, to which the thumb or finger is to be applied, when it is desired to press back the springs; or the spring-pieces may be made without buttons, and inserted in the sashes, as shewn at *i*, whereby they will be hidden from view when the sashes are placed in the frame *d*. When the spring-pieces are attached to the frame *d*, strips or plates of metal, wood, or other thin rigid substance, are fixed upon the edges of the sashes, for the pins of the springs to press against; and thereby the bands or cords, which lie in the grooves, are protected from the action of the springs.

Fig. 4, exhibits a modification of the above arrangement, in which the end b^1, of the band or cord *b*, is secured to the edge of the sash *a*, near the bottom of the same; from thence it is carried upwards and over the roller *c*, attached to the frame *d*; and then the other end of the cord is secured at the point *j*—the frame is grooved for the reception of the band or cord. The upper sash *e*, is suspended in a similar manner.

Another modification consists in attaching one end of the band or cord to the under-side or edge of the sash, then passing the band or cord over a roller, placed at the corner of the sash, and finally securing the other end to the top of the window-frame.

The third modification consists in suspending window-sashes, shutters, and blinds, by means of bands or cords of vulcanized India-rubber, gutta percha, leather, or other pliable and suitable material, in combination with the common box-spring; and this is effected by securing the lower end of the band or cord to the edge of the sash, as at b^1, in fig. 4, and attaching the other end to a box-spring, which is fixed to the frame *d*, in the same position as the roller *c*, in fig. 4; so that when the sash is raised the band or cord will be wound or coiled upon the box-spring.

In the fourth modification, the box-spring is fixed to the sash, and one end of the band or cord is attached to the box-spring, while its other is secured to the top of the window-frame.

Fig. 5, exhibits the fifth modification, which consists in suspending each sash by attaching one end of each band or cord to the same box-spring, (which is fixed at the centre of the top part of the frame, as shewn at *k*,) and securing the other end of each band or cord to the edge of the sash.

Fig. 6, is a transverse vertical section of a carriage-door, to which the last part of this invention has been applied; and fig. 7, is a back view thereof, with part broken away. *a*, is the sash, to the lower part of which the bands or cords of vulcanized India-rubber *b*, *b*, are attached; and, after passing over rollers at the top of the strips of metal *c*, *c*, their other ends are secured to the lower part of these strips of metal. A thumb-spring bolt *d*, is fixed to the side of the frame, and takes into holes in the edge of the sash, for the purpose of retaining the sash at any required degree of elevation. The patentee, in some cases, modifies this arrangement, by suspending the sash by means of bands or cords of any pliable and suitable material, in combination with box-springs, which may be fixed to the top or bottom of the strips of metal *c*, *c*. He does not confine himself to the use of two bands or cords, as one, or any other number, may be adopted. When the blind *e*, is raised, it rests upon the ledge *f*, which turns on pivots to let the blind pass, and then falls again. This mode of suspending admits of the grooves in the frame being made parallel.

The patentee claims, Firstly,—the hanging or suspending window-sashes, shutters, or blinds, by means of bands or cords of vulcanized India-rubber, or other similar elastic material, in manner above described. Secondly,—the hanging or suspending window-sashes, shutters, or blinds, by means of bands or cords of vulcanized India-rubber, or other suitable material, acting in combination with common box-springs, as above described. Thirdly,—the hanging or suspending of the window-sashes or blinds of the doors and windows of carriages, by means of bands or cords of vulcanized India-rubber, or other similar elastic material; or by bands or cords, of suitable substances, in connection with the box-springs, as above described.—[*Inrolled in the Inrolment Office, May,* 1848.]

To JEAN NAPOLEON ZERMAN, *of Greenwich, in the county of Kent, Captain in the French Navy, for improvements in ships and other vessels.*—[Sealed 8th February, 1848.]

THIS invention consists in constructing ships and other vessels with a longitudinal channel or passage through the lower part of the same.

In Plate X., fig. 1, exhibits a transverse section of a vessel, constructed according to this invention. The outer parts of the hull are to be made of timber, iron, or other suitable material, in the usual way; but the keel is dispensed with, and the parts *a*, *b*, of the bottom are made flat, or nearly so. *c*, is the longitudinal channel or passage, the sides of which are vertical and parallel, or nearly so; it is open at the under part and at the ends, so that when the vessel is in motion the water may pass freely through it. The ends of each half of the vessel may be furnished with a stem and stern-post of the ordinary description; or any other mode of constructing or securing the ends may be adopted. The stern end of each half of the vessel must be furnished with a rudder, so that the vessel will possess two rudders, as shewn at fig. 2; and the two rudders must be connected by a parallel motion, as represented at fig. 3, (which is a plan view of the stern of a vessel) in order that they may move together, and be at all times parallel. If it is desired that the vessel should be capable of being navigated with either end foremost, then it must have a pair of rudders at each end, provided with a parallel motion.

A vessel, constructed as above described, must be strengthened in some manner, so as to keep the sides of the channel or passage, as well as the sides of the vessel, in their proper positions, and enable them to bear any strain to which the vessel may be subjected. A mode of effecting this is shewn at fig. 4, (which is a horizontal section of the vessel) and also at fig. 1; *d, d,* are metal rods or bars, extending across the channel or passage, and secured to the sides thereof by nuts and screws; *e, e,* are other metal rods or bars, extending from one side of the vessel to the other, and secured, by nuts and screws, not only to the outer sides of the vessel but also to the sides of the channel or passage. There are two rows of rods; the long and short rods are placed alternately in each row, and so that the long rods of one row are beneath the short rods of the other row; and the whole of the rods in each row are connected together by a longitudinal rod *f.* The outer sides of the vessel, as well as the sides of the channel or passage, may be still further strengthened by iron straps *g,* (fig. 5,) connected with the transverse rods or bars.

Fig. 5, exhibits a mode of securing a mast in a vessel constructed according to this invention; but any other suitable method may be adopted. *h,* is a metal column, fixed to the deck or top of the channel or passage, and to the transverse rods or bars *d, e*; on the upper end of the column is cast or fixed a socket *i,* to receive the lower end of the mast *j*; the socket rises to the upper deck, to which it is to be secured by a flange and screws; and the lower end of the mast is inserted into the socket and secured to the deck in the usual way.

When the vessel is intended to be propelled by steam power, the paddle-wheel or other propeller may be placed in the channel or passage. Propellers may, however, be placed at the sides of the vessel, in the ordinary manner.

The chief objects of this invention are to cause ships and other vessels to draw less water, and to stand more steadily and without ballast, and to prevent them from drifting from their course.

The patentee claims, as his invention, the mode of constructing ships and other navigable vessels with open longitudinal spaces or tunnels at the bottom or lower parts thereof, as above described.—[*Inrolled in the Inrolment Office, August,* 1848.]

To Joseph Foot, *of Spital-square, in the county of Middlesex, silk manufacturer, for improvements in the manufacture of sieves.*—[Sealed 5th April, 1848.]

This invention relates to the operation of weaving sieve-cloth. In the ordinary mode of making sieve-cloth much depends upon the judgment and skill of the weaver in throwing in the weft and winding up the work from time to time, so as to cause the weft to be as nearly as possible at equal distances apart in the fabric. Now, this invention consists in causing the sieve-cloth, as it is woven, to be nipped or held between two rollers; by the rotation of which, after each beating up of the weft, the fabric is moved forward the required distance, in order to form square meshes.

In Plate XII., fig. 1, is a longitudinal vertical section of a hand-loom, having the patentee's improvements applied thereto. *a*, is the warp; *b*, is the batten; and *c*, is the work-beam, which is caused to wind up the fabric by the weight *d*, attached to a cord *e*, that passes over a pulley, and is partly wound upon the work-beam. The fabric, before it arrives at the work-beam, first passes partly round the rollers *f*, *g*, by which it is gradually drawn forward as it is made; these rollers are covered with felt or other suitable cloth or fabric; the roller *g*, is constantly pressed towards the roller *f*, by means of springs acting upon the bearings of the axle of the roller *g*; and the two rollers are geared together, so as to revolve with the same surface speed. It is by the distance which these rollers are caused to move between each beat-up of the loom that the distance between the weft-threads is regulated, and upon it the fineness or coarseness of the fabric (so far as the weft-threads are concerned) depends. The rollers are made to revolve in the manner required by the following or any other suitable means:—Two of the levers *h*, *h*, (worked by the treadles in the usual manner) are connected by cords *i*, *i*, with one end of the lever *j*; the other end of this lever is connected by a cord *k*, and spring *l*, with the lever *m*, for the purpose of lifting that lever, which is caused to descend again by its own weight. The lever *m*, carries the driver *n*, for giving motion to the ratchet-wheel *o*, and the distance which this lever shall rise and fall, and, consequently, the extent to which it will turn the ratchet-wheel *o*, is regulated by the adjustable stops *p*, *q*,—a front view of which stops is shewn at fig. 2. A pinion *r*, is fixed on the axis of the ratchet-wheel *o*, and drives a toothed-wheel *s*. On the axis of this wheel *s*, is fixed a pinion *t*, which gears into a toothed-wheel *u*, affixed to the roller *f*; and the wheel *u*, gears into the wheel *w*, fixed to the roller *g*. *v*, is a stop, which prevents the batten from moving forward more than a certain distance at each beat-up of the weft.

The patentee says, that although he has only shewn his improvements applied to a hand-loom, yet steam or other power may be employed for giving motion to looms constructed according to his invention. He claims the applying nipping-rollers in such manner as successively to wind up a quantity of the warp (*qy. work*) corresponding to the distance required between two weft-threads.—[*Inrolled in the Inrolment Office, October,* 1848.]

To BENJAMIN GUY BABINGTON, *of George-street, Hanover-square, in the county of Middlesex, doctor of medicine, and* JOHN SPURGIN, *of Guildford-street, in the county of Middlesex, doctor of medicine, for improvements in the manufacture of metallic pens.*—[Sealed 27th March, 1848.]

THIS invention consists in the application of a piece of zinc or a suitable alloy of zinc to metallic pens, in such manner as to produce a galvanic action when the pen is in use or contains ink, and thus to confine the oxidation or corrosion to the zinc; so that the points of the pens will only be liable to be worn by friction, caused by the act of writing.

In Plate X., figs. 1, exhibit the concave and convex sides and also a longitudinal section of a metal pen, provided with a piece of zinc *a*, according to this invention; and figs. 2, shew, in back view and longitudinal section, another pen, furnished with a similar piece of zinc *a*. The shape of the pens, and the manner of applying or affixing the zinc thereto, may be varied, so long as the combination of the pens and pieces of zinc be such as to produce the desired galvanic effect. In the drawings the piece of zinc is shewn as affixed by one end to the pen, by passing a portion of it through a slot in the pen, and spreading out this portion to form a rivet head. Instead of the zinc being affixed to the pens, it may be attached to the pen-holder, provided the zinc be so applied, that when a pen is inserted in the holder the zinc will be in contact therewith; so that when the pen contains ink a galvanic action will take place, and the points or nibs will be protected;—but the patentees prefer to fix the zinc directly to the pen.

The patentees claim the combining zinc or a suitable alloy of zinc with metallic pens, so as to obtain a galvanic action, and so preserve the points or nibs, as above described.—[*Inrolled in the Inrolment Office, September,* 1848.]

To Eugene Ablon, *of Panton-street, Haymarket, for improvements in increasing the draft in chimneys of locomotive and other engines,—being a communication.*—[Sealed 8th April, 1848.]

The apparatus whereby the inventor proposes to increase the draft in the chimneys of locomotive and other engines, is shewn in connection with the smoke-box and chimney of a locomotive engine, in Plate XII. *a*, is a pipe of copper, or other suitable material, affixed to the chimney *d*, by bands *b*, *b*; one end of this pipe is enlarged, and is open to the atmosphere; and the other end enters into the smoke-box. *c*, is the steam or blast pipe, which enters the enlarged portion of the pipe *a*. The steam from the pipe *c*, ascends through the short portion of the pipe *a*, and, by its exhausting action, causes the air, which enters at the mouth or enlarged end of the pipe *a*, to rush rapidly through the same into the chimney. It is stated that this current of air will flow with uninterrupted rapidity, although the action of the steam is intermittent.

The pipe through which the air passes may be arranged in any other form around the chimney, and may enter into the smoke-box at one side, instead of at the front. It may consist of two parallel branches, laid horizontally on the side-framing of the locomotive engine, and united near the fire-box by a semicircular piece; and it may enter the smoke-box at the front or at one side thereof.

The patentee claims the mode of arranging apparatus, whereby currents of steam and air are brought to act together in the chimneys of locomotive and other engines, so as to accelerate the draft therein.—[*Inrolled in the Inrolment Office, October,* 1848.]

To William Eaton, *of Camberwell, in the county of Surrey, engineer, for improvements in machinery for twisting cotton or other fibrous substances.*—[Sealed 1st December, 1847.]

This invention of improvements in machinery for twisting cotton or other fibrous substances relates to the preparation of "rovings" of cotton or other fibrous substances; and has for its object to give a slight degree of permanent twist to the rovings, just previous to their being wound on to the bobbins preparatory to spinning. The present invention may be considered as an improvement upon a patent granted to the present patentee on the 9th day of February, 1847.

In Plate XI., the apparatus for effecting this object is shewn in front elevation at fig. 1, and in side elevation at fig. 2. The ribbon of cotton or other fibrous material is conducted from the delivering-rollers, above, down a tube or hollow flyer, which has a slot in its side the greater part of its length, and through an eye or trumpet at the bottom of the flyer, which is so constructed as to admit of its running in a step, whereby the flyer will be steadied in its rapid motion. The cotton now passes over a curved brass or other wire, and through another eye or trumpet in the interior of the apparatus; and from this it is distributed upon a wooden bobbin or roller, by means of this latter eye or trumpet having a traverse motion. In passing down the hollow flyer, which is in rapid motion round the central parts of the machine, and through the traverse trumpet or guide on to the bobbin, the ribbon of cotton will have received two turns or more of permanent twist for every revolution of the flyer; and yet neither end of the ribbon of cotton is turned round to accomplish the twisting, and form the roving or slubbing.

Having thus briefly pointed out the method of effecting the object of the invention, the patentee proceeds to describe more in detail the peculiar construction and arrangement of the apparatus. The cotton or other fibrous substance is conducted from a pair of drawing-rollers, above, down the inside of the tube or hollow flyer *a*, *a*, a^1, which is mounted vertically in a hollow bearing a^*, and is actuated by means of a band coming from any prime mover and passed round the pulley *b*. A toothed wheel *c*, is fixed to the under side of the hollow bearing a^*, and therefore always remains stationary. A second wheel *d*, having an equal number of teeth, is on the upper end of the short shaft *e*, and gears into the stationary toothed wheel *c*. The shaft *e*, is mounted in bearings at the end of an arm extending from the tube or hollow flyer *a*, and is consequently carried round with the said flyer, when the latter is put into motion by the band and pulley *b*. Another toothed wheel *f*, at the lower end of the shaft *e*, gears into a similar wheel *g*, (all four gearing-wheels being of like pitch), which is mounted on the bearing g^*, and is stationary. It will be understood that as the wheel *c*, is fixed to the hollow bearing a^*, and is therefore stationary, the wheels *d*, and *f*, will, with their shaft *e*, be carried round this stationary wheel *c*, and consequently round the toothed wheel *g*, and every portion of the ensuing apparatus (not yet described) attached to the wheel *g*, and its bearing, will be always kept in the same position,—that is, will be prevented from rotating. The tubular portions of the flyer, marked *a*, are made of brass. That part of the flyer marked a^1, a^1, is composed of steel, and has a slot running along its whole length. The spindle point runs in a step fixed on a part of the frame of the machine, and is intended to steady the flyer in its rapid revolutions. The ribbon of cotton, after passing from the drawing-rollers, is conducted down the interior of the hollow tube or flyer *a*, *a*, a^1, and is brought over the curved wire *h*, through a trumpet-mouth traverse-guide *i*, and distributed upon the wooden bobbin or roller *k*;—the ribbon of cotton having in its passage through the rotating flyer *a*, and from thence to the bobbin, received a permanent twist, as above mentioned.

The patentee next proceeds to describe the means of distributing or winding the roving upon the cylindrical bobbin or roller *k*, so as to form a full bobbin of roving, of a cylindrical shape in the middle and conical at each end, as is now preferred by cotton spinners. The steel or iron framing *l*, *l*, *l*, is firmly fixed to the wheel *g*, and hollow bearing g^*, and therefore, as above described, remains quite stationary and suspended within the flyer, which is in rapid motion. *m*, *m*, is a short shaft, fixed firmly into the boss part of the hollow tube or flyer; it passes loosely through the wheel *g*, and the hollow bearing g^*, and has a small bevil pinion *n*, keyed on its lower extremity. This pinion gears into the larger bevil wheel *o*, which is keyed upon the axis of the hollow fluted roller or drum *p*, *p*, which has a groove cut round it at about the middle of its length, to form a space for the short shaft *m*. This short shaft *m*, being keyed firmly into the boss of the flyer, it will be carried round with it, and thereby give a slow horizontal revolving motion to the fluted drum *p*, *p*; and, by means of the relative sizes of the bevil pinion *n*, the bevil wheel *o*, and the circumference of the fluted drum, it is so arranged, that the surface velocity of this fluted drum shall be precisely the same surface velocity as that of the upper delivering-rollers. The bobbin or roller *k*, is, by means of the strong elastic band *q*, *q*, *q*, which passes over the fixed bearings *r*, *r*, *r*, pressed against the fluted drum, and thereby made to receive a revolving motion from its contact. Its surface velocity for winding up the roving will always be correct, whether the bobbin be empty or nearly filled with roving. In each of the sides of the stationary framing *l*, *l*, *l*, a slot or groove s^*, s^*, is cut, to admit of the up-and-down play of a thin light steel or metal framing *s*, *s*, *s*, which carries the shaft of the bobbin or roller *k*, and the shaft *n*, and cross bar *y*. *t*, t^*, are two fine light equal toothed wheels;—the wheel *t*, is keyed on to the axis of the bobbin *k*; and the other t^*, into which it gears, is keyed on to the axis of the double-threaded screw-shaft *u*, *u*; into which screw *u*, *u*, the pointed lever *v*, is inserted, and kept in a proper position by the guide-rod *x*, for traversing along the thread of the screw-shaft *u*, *u*. Its other socket extremity *v**, traverses along the cross bar *y*. Upon the pointed lever *v*, *v*, is fixed a cross lever *w*, *w*, each end of which is of a wedge shape, with a knuckle joint; and each end of this lever acts alternately, in its traversing movement, between the cogs in the wheels A, A, thereby giving a small portion of a revolution to these wheels; and the nut or boss of each wheel, having a screw-thread within it, is thus made to advance very slowly upon the partially threaded ends *z*, *z*, of the cross bar *y*. As soon as the end of the cross lever *w*, *w*, has advanced sufficiently between two cogs of either wheel A, A, at either end of the screw-shaft *u*, *u*, a stop on the lever *w*, *w*, comes in contact with the face of the wheel A, and instantly throws the pointed lever *v*, *v*, into the other thread of the double screw *u*, *u*, whereby the motion is instantly reversed, and the lever *v*, is caused to traverse to the other end of the screw-shaft *u*, *u*. B, B, are bolts, one being provided for each end of the slide framing *s*, *s*. Across the fixed framing *l*, *l*, *l*, horizontal slots are cut, for the purpose of doffing or taking out the bobbin *k*, when filled with rovings, and replacing an empty bobbin, to recommence the operation: to effect this, the bolts B, are withdrawn.

The action of the above described machine is as follows:—The band and pulley *b*, turning the flyer *a*, *a*, puts in motion the shaft *m*, *m*, and thereby the bevil pinion *n*, and bevil wheel *o*; a slow rotary motion is thus given to the axis of the fluted drum *p*, *p*, which gives motion to the bobbin or roller *k*; and, by this means, motion is communicated to the toothed wheel *t*, which, gearing into *t**, gives motion to the double threaded screw-shaft *u*, *u*, and thereby causes the pointed lever *v*, *v**, and the small trumpet *i*, (through which the roving passes) to traverse at a proper speed (according as the machine has been arranged for the size of the roving) on the shaft *u*, *u*, and cross bar *y*. By this means the twisted roving is distributed equally and firmly, by the pressure of the elastic bands *q*, *q*, upon the roller *k*, in the form of a cylinder in the middle and conical at each end of the bobbin; which latter shape is accomplished by the cog-wheels A, A, being very slowly advanced on their screwed axles *z, z,* nearer to each other at each successive traverse, by means of the cross lever *w, w,* acting upon the cogs of each wheel. The object of the curved wire *h, h,* is to keep the roving at an equal and proper tension at every varying position of the traverse apparatus, when distributing the roving upon the bobbin.

The patentee remarks, that several sets of the apparatus, herein shewn, may be mounted in a frame, somewhat in the manner of the tube frames now used for making rovings without permanent twist in them; and it will therefore be evident, that the arrangements of the several parts must, when applied in this manner, be somewhat modified, to suit the views and opinions of different manufacturers.

He claims, Firstly,—the means of forming a roving or slubbing of cotton or other fibrous substances with a permanent twist therein, by causing the said roving or slubbing to pass through the hollow flyer and other parts, as above described, and distributing or winding the same on to a bobbin; the roving having, under this operation, received a permanent twist without either end of the said roving turning round; he also claims the application or employment of the machinery above described, or any modification of the same principle, to twist together two, three, or more single threads of cotton, yarn, or other threads, and to wind the same upon spools or bobbins, to make sewing cotton, lace, thread, &c. Secondly, he claims the means above shewn, or any mere modification thereof, for putting a permanent twist into strands of twine, string, cord, or rope; and also for twisting afterwards two, three, or more of these strands or cords together, so as to form a thicker one;—the apparatus or machine being constructed, as respects dimensions and strength, according to the nature and object of the intended operation. —[*Inrolled in the Rolls Chapel Office, June,* 1848.]

To Charles Fielding Palmer, *of Birmingham, in the county of Warwick, druggist, for a new or improved chalybeate water.*—[Sealed 27th April, 1848.]

This invention consists in the production of an artificial chalybeate water, in which a basic or neutral salt of the protoxide of iron is held in solution by the means hereafter described.

Three parts, by weight, of citric acid, are dissolved in eighty parts, by weight, of water; then eight parts, by weight, of protosulphate of iron are introduced; and, lastly, forty parts, by weight, of syrup are added. The patentee then takes a number of bottles, and into each he puts some of the solution;—the exact quantity being determined by the strength which it is desired that the chalybeate water should possess. He usually prepares the chalybeate water of two degrees of strength,—the one containing two grains of protosulphate of iron, and the other containing double that quantity, for each bottle capable of holding four fluid ounces. The patentee next prepares (in an ordinary soda-water machine) a solution of carbonate of soda and carbonate of potash in water, of such strength that four fluid ounces of the solution will contain three grains of carbonate of soda and three of carbonate of potash. This solution is impregnated with carbonic acid gas, and introduced into the bottles which have previously received the solution containing the protosulphate of iron and citric acid, so as nearly to fill the same; and the bottles are then corked under pressure, so as to retain the carbonic acid gas.

The patentee does not confine himself to the precise method of carrying out the invention, as the same may be varied without departing from the nature of the invention;—for example, instead of citric acid, tartaric acid may be substituted, or the citrates or tartrates, together with several other acids and salts. He claims, as his invention, the making of a solution in which any neutral or basic protosalt of iron, in conjunction with any other salt, is held in solution in water charged with carbonic acid gas; which said solution affords a precipitate on the application of heat.—[*Inrolled in the Inrolment Office, October*, 1848.]

To Thomas Potts, *of Birmingham, brass tube maker, for improvements in the manufacture of tubular flues of locomotive and other steam boilers.*—[Sealed 10th April, 1848.]

The patentee states that he has observed the brazed or soldered joints of the tubular flues of locomotive and other steam boilers (when the tubes are made of copper or brass) to be less prejudicially acted upon by the friction of the sharp grit which escapes from the fire-box than the copper or brass surface of the tubes; he therefore proposes to line the tubes with a similar description of metal to that now used for brazing or soldering the joints.

The patentee takes what is called "bath metal," composed of three parts of best selected copper and two parts of foreign zinc, and adds ten ounces of refined tin to each hundredweight of the metal; he then rolls the metal into a plate or strip, and forms the same into a tubular shape, of the size required (the edges butting together); after which, he anneals the tubes and stretches them, so as to straighten them and bring the edges correctly together. On each of these tubes he places a tube formed of copper or an alloy of copper; and the compound tube he puts on to a steel mandril, made with a taper of about one-sixteenth of an inch into its whole length, which not only facilitates the withdrawal of the mandril, but also gives additional thickness to that end of the tubular flue which is to be fixed to the fire-box of the steam-boiler. The compound tubes, each having a mandril within them, are then drawn through dies or draw-plates. The patentee says, he has not found it necessary to solder together the edges of the inner tube or lining of bath metal, as it will be sufficiently strong without this being done; and the water cannot pass through because the outer tube is perfect. He prefers to make the lining twice as thick as the outer tube.

The patentee does not confine himself to the exact proportions, above given, of the materials which form the bath metal; neither does he claim the making of bath metal; but what he claims is, the use of a lining of such a preparation of metal for lining tubular flues of copper and of copper alloyed; the object being to obtain a lining of metal which shall be less prejudicially acted on by the passage of sharp grit from the fire than if the whole tube were made of copper or of copper alloyed, as heretofore.—[*Inrolled in the Inrolment Office, October,* 1848.]

To MICHAEL JOSEPH JOHN DONLAN, *of Abbots Bromley House, Staffordshire, Esq., for improved compounds or mixtures to be used for lubricating machinery.*—[Sealed 4th April, 1848.]

THIS invention consists in the production of three compounds or mixtures for lubricating machinery, termed, by the patentee, "attrition preventive compounds," Nos. 1, 2, and 3.

The ingredients used by the patentee, in preparing the mixtures, are as follows:—Green leaves of the laurel; green leaves of the ivy; oxymuriate of mercury; subnitrate (or *trisnet*) of bismuth; sulphate of copper; sulphate of zinc; tartarized antimony; pulverized Roman alum; Greenland or southern whale oil; gallipoli or olive oil; sperm oil; palm oil; caoutchouc; common brown soap; minium; white pepper; ceruse; common salt; and powdered alum;—black lead and celestial blue, in powder, are also used to color No. 3, compound.

No. 1, compound, which is to be used exclusively for lubricating the axle-boxes of locomotive engines, tenders, and other heavy bearings, is made in the following manner:—¼ oz. of oxymuriate of mercury, ¼ oz. of subnitrate (or *trisnet*) of bismuth, and ¼ oz. of tartarized antimony, are pulverized in a mortar, and then put into an iron vessel, called a Papin's digester (which will hold two gallons), with four quarts of water, heated to 110° Fahr. The liquid is agitated with a brush for three minutes; it is then allowed to rest for an hour; at the expiration of this time, ¼ oz. of sulphate of copper, ¼ oz. of sulphate of zinc, and ¼ oz. of ceruse are added, and the whole is agitated for five minutes; the liquid is then permitted to remain in a quiescent state for an hour; and after this it is strained through a linen cloth into another Papin's digester, of the same size as the first. 8 oz. of green laurel leaves and 8 oz. of green ivy leaves are cut into small pieces, and pounded in a mortar; then ½ oz. of pulverized Roman alum is added; and the mixture is put into a strong finely perforated copper vessel, 4½ inches in diameter and 10 inches long; in the side of the vessel is an iron door, and at the top of the vessel is fixed an iron ring, to which is attached a chain, about 6 feet long, that passes over a pulley, and has a weight of 3 lbs. suspended from it. When the leaves and alum have been introduced into the perforated vessel, the door is secured, and it is immersed in the liquid in the Papin's digester, which is to be kept at a heat of 112° Fahr. for an hour. 120 gallons of Greenland or southern whale oil are now put into a copper boiler, and the perforated vessel is immersed therein to the depth of 3 inches below the surface of the oil (being prevented by the counter-balance weight from descending below that depth); the oil is kept at a heat of 150° Fahr. for an hour, and then the perforated vessel is taken out; after which 48 lbs. of the best caoutchouc, cut into small pieces, are added to the oil, and the heat is increased to from 230° to 250°, which is maintained for twelve hours;—the liquid being stirred occasionally with an iron rod, having a small bowl at the end. When the caoutchouc is dissolved, the oil will be freed from its impurities (thrown down as a concrete precipitate with an earthy basis) and will combine with the caoutchouc; the liquid is then to be drawn off into coolers, and the residuum or precipitate is to be removed from the copper boiler and thrown away. When cool, the liquid is to be passed through a tin strainer, coarsely perforated, and returned to the copper boiler; and then 12½ lbs. of palm oil, 25 lbs. of minium, 12½ lbs. of ceruse, and 3½ lbs. of powdered alum are to be added. The patentee here says, "But care must be taken in paying attention to these instructions for manufacturing this compound, else it will kill the superintendent;" and "note, as portions of marine acid and mineral alkali are continually dissolved in sea water, I add to these ingredients, when this compound is designed for marine engines, 2 lbs. of black pepper, finely pulverized:" this will not be necessary when the compound is to be used for inland purposes. After the above ingredients have been added to the liquid, a gradually increased heat is to be applied thereto, until it arrives at 230°, which is to be maintained for six hours; at the end of this time the compound will be perfectly amalgamated, and is to be allowed to cool down to 150°; it is then drawn off into coolers, which completes the process.

No. 2. compound, which is designed for lubricating the syphons, slides, tubes, &c., of locomotive, marine, and stationary engines, is made in the following manner:—120 gallons of Greenland or southern whale oil, 25 gallons of gallipoli, or olive oil, 6½ gallons of sperm oil, and 3½ lbs. of common salt are put into a copper boiler, and the perforated vessel is immersed therein, as above described—the perforated vessel may be used several times without requiring a fresh supply of laurel and ivy leaves; but ½ oz. of pulverized Roman alum must be introduced into it previous to each immersion. The oil is kept at a heat of 150° for one hour; then the perforated vessel is taken out and the heat continued for two hours longer; at the expiration of this time 6½ lbs. of pulverized alum, 12½ lbs. of ceruse, and 2 lbs. of white pepper are added, and the heat is increased to 250°, which is maintained for six hours; the mixture is then allowed to cool and remain quiescent for twelve hours; after which it is drawn off through a bag, made of cloth and horse-hair, into coolers: it is now ready for use.

The mode of making No. 3, compound, which is to be used for lubricating the wheels of railway-carriages and luggage-trucks, is as follows:—120 gallons of Greenland or southern whale oil, 3½ lbs. of common salt, and 3½ lbs. of common brown soap, in small pieces, are put into a copper boiler; the perforated vessel is immersed in the liquid, and the latter is kept at a heat of 150° for one hour; the perforated vessel is then withdrawn, and 50 lbs. of the common kind of caoutchouc, in small pieces, are added; this mixture is subjected to a heat of 250° for twelve hours (being stirred occasionally), and is then permitted to cool to 150°, at which temperature it is passed through a tin strainer, coarsely perforated, into coolers, from which it is returned to the copper boiler. Then to every 3 gallons of oil are to be added 2¾ lbs.

of minium, 1¾ lb. of ceruse, 5½ lbs. of palm oil, 1½ lb. of black lead, and ½ lb. of celestial blue; the mixture is kept at 250° for seven hours; after which it is allowed to cool to 150°; and it is then discharged into the coolers, ready for use.—[*Inrolled in the Inrolment Office, October,* 1848.]

Scientific Notices.

THOUGHTS ON THE SOCIAL POSITION OF MEN OF SCIENCE.

In our last number we took occasion to animadvert upon the folly of men expecting, at the present day, that an assumption of personal importance, backed merely by some honorary initial-letter appendage to their name (indicative originally of desert, but now, in many instances, lavishly and ridiculously conferred), should impose upon public credulity, and draw forth spontaneous admiration of their abilities. We would now somewhat further pursue this subject, in order to draw attention to a class of men whose time, it would appear, for receiving public honors has not yet arrived, but whose unregarded claims to national gratitude would, if well and justly considered, shew that, as a body, they have at least been treated with neglect.

It is a truth—howbeit a most unpalatable one to many ambitious men—that enduring fame is only to be attained by conferring lasting benefits on mankind; and that the talents of a hero, a statesman, or a philosopher, however transcendent they may be, will, if improperly applied—no matter the degree of popularity he may acquire for the time being—eventually subject his memory to the detestation of the world, or, with his name, be lost to remembrance. A hasty recurrence to some of the most prominent characters who have played a part in military annals, will readily suggest the different feelings with which we contemplate the career of the warrior lusting after foreign conquests, and that of him who arms for his country's freedom; while, on the other hand, it involves a careful search among worm-eaten tomes, to discover so much as the names of many literary men, of undoubted genius, who have produced works of great wit and learning, but which, from being sullied by ribaldry, or tainted by profanity, have, with their authors, sunk into oblivion. Such, then, being the undeviating fate which awaits misapplied genius from the unerring decision of posterity, it is strange that, among the mass of men whose ambition prompts them to strive for fame, so few should set out in the right path; and that, blind to the advantages of a good example, the eager competitors for this reward should so completely overlook the many instances of humble plodders, whose well-applied perseverance has enabled them to quietly mount the envied ladder, if not to attain its highest round. We would not lay too much stress upon this motive for useful exertion, but it is at least no disgrace to desire the good opinion of our fellows; while, as a counteracting influence to the feeling of *virtus post nummos*, we may reckon upon an honorable ambition as most useful. It may, in many cases, be, that the desire for riches is the humble garb which ambition, coupled with small natural gifts, assumes, when impressed with the futility of entering into mental competition with the highly-endowed ambitious spirit. If so, it would be well, as a kind of stimulant to more healthy exertion, to point attention to success achieved, and fame acquired, by humble talents,—as in the case of Washington; or, if the standard measure of his mind be questioned, we have yet a better instance in Howard, the philanthropist, of moderate abilities, perseveringly directed with utility of aim, earning for their possessor a renown which all the world might justly envy. The intensity of purpose which buoyed up Howard in his melancholy wanderings through the dungeons of wretchedness and crime, and made him instrumental in alleviating the sufferings and opening the door of hope to thousands of helpless, despairing creatures, was not the result of superior natural endowments, but is a quality possessed in its elements by most men, and capable, under proper encouragement, of a certain development in all. It is not, however, necessarily to the man possessing a well-directed intensity of purpose that posterity will award a place among the ancient worthies, for there are many remarkable instances of men who have exhibited as much perseverance and intrepidity in effecting an escape from prison as did Howard to force an entrance; but the recital of their daring merely raises our wonder, or obtains, perhaps, a passing commendation.

Successful exertion in the cause of humanity we have asserted to be the only certain key to the temple of fame; and we have shewn, by examples (which might readily be amplified), that the possession of genius is not absolute to the attainment of the prize; but further, we do not hold it essential that the course of action which benefits mankind should, on completion (like the conquests of Cincinnatus), leave the benefactor as poor as at the outset of his career: the glitter of honestly-acquired wealth can neither eclipse his moral worth nor damage his fame with posterity. Now, if Howard, by his exertions in behalf of the outcasts of society (men who had fallen to their low estate as a just punishment for their offences) has enrolled his name in the imperishable annals of the world, it is, we think, but fair that those who have assisted in removing the pretext for crime, by opening out a path for honest industry to obtain a comfortable subsistence, should receive a proportionate reward. Our readers will here, doubtless, anticipate us in our allusion to that class of men who, without flattery, may be termed the creators and upholders of England's commercial greatness. It is, we conceive, owing to the diffusion (though it is at present but too partial) of profitable labor, resulting from the ingenuity and skill of the worthy followers of Watt and Arkwright, that England, in the midst of her great commercial troubles, has had to lament no social disorders, engendered by want and misery; but is enabled to present so calm a front to Europe, and prove that uncontrolled enterprise is no bar to general prosperity. As respects the benefits which the nation has received from the labors of the philosophic Watt and the persevering Arkwright, so marvellously well-timed for their mutual success, we have no less an authority than Alison, the historian, for the assertion that the multiplied powers of production in manufactures which their inventions gave rise to, were the main sources from whence the country was supplied with wealth to subsidise the leagued powers of Europe, and crush the tyranny which threatened the existence of liberty. It would be needless to throw into account the thousand improvements which the steam-engine in the one case, and spinning machinery in the other, have given rise to, in order to heap up a sufficient accumulation of *benefits to mankind* to ensure these men a *living name*,—for there already exists a manifest desire that they should take rank with the illustrious dead. Why, then, should their successors, who doubtless keep up, amongst much rivalry, the superiority of English manufactures, meet with no regard for their patriotic exertions, and achieve no personal advancement or consideration, except through the power consequent on the wealth which they accumulate? Why is the *inventor* less in esteem than a follower of one of the learned professions? It cannot be that he is a less useful member of society; for an invention which cheapens production in an article of general use, immediately benefits the whole community (as was the case with Arkwright's discoveries), to say nothing of the increased amount of profitable occupation which it may provide for the poor. Some cause must certainly exist for this anomalous feeling displayed towards men, who, by every addition to their own fortunes, have added vastly more in the aggregate to the resources of the laboring community. Of avarice they cannot certainly be accused, for theirs is generosity to profusion; nor is it want of appreciation for the refinement of art—the most frequent evidence of an uncultivated mind—for the extensive patronage of artists, by rich manufacturers, is proverbial. Jealousy of existing rivals, creating, as it ever will, personal detraction, may, in some small degree, account for the present social position of inventors; but there must be a far stronger reason than this to render the public forgetful of the benefits which it receives at their hands.

Some months since the members of the bar took alarm at the decreasing estimation in which they fancied their profession was held; and, in order to ascertain the origin of this feeling, as well as to raise their honorable profession to the proper line of flotation, as the naval architect would express it, a general meeting of the whole body was called. The result of their deliberations was the passing of very stringent rules, which brought certain loose practices into discredit, and rendered them cognizable by the heads of the Inns of Court. It is much to be regretted that no such combination of interests exists amongst inventors and manufacturers, to render a similar proceeding on their part possible; for the salutary fear of being put *without the pale* would, we doubt not, check, in a great degree, the irregularities, not to say dishonesty, by which valuable inventions are sometimes acquired. This is a delicate theme, and one on which we might, with advantage, enlarge; for we are sure that until proper means are taken by manufacturers themselves to set a ban upon those of their community who will unscrupulously appropriate to their own use the property of others, they will certainly never assume that place in public estimation which their talents and their industry entitle them to occupy. If we were not well assured of the true English honesty of the mass of those engaged in the manufacturing arts, we should not thus approach the subject, but rather call for legislative interference, in a matter so vital to the interests of the country; or, if the discreditable practice of working inventions, in defiance of the patentee's rights, were merely exercised by public trading companies, we should consider it simply as the development of a law of nature, that as you divide responsibility, so in a like ratio will conscience be divided among the holders of that responsibility.* It may be said that the courts of law are open to the aggrieved, so also are commissions open to purchase from men in the ranks, yet no one wonders that all privates do not rise to command. The courts of law, as at present constituted, can never create the wholesome feeling which we desire to see universal among inventors, viz., that of fear lest one should unconsciously trench upon another's rights,—although the sound judgments which are frequently pronounced therein teach caution, not only to the single-handed pirate, but also to those *divided responsibilities* whose feelings are only awakened by a drain upon their exchequer. But there is, as we believe, to be found within the great body of inventors and manufacturers an available power, which, if judiciously applied, would soon induce an interchange of confidence among its members, that would go far to raise in them the standard of self-respect,—that indispensable prelude to the acquirement of personal esteem; and thus form a groundwork for raising the social standard of the whole body. This power, to which we allude, we need scarcely state is simply a *moral power;* but if it were represented by men chosen for their good sense and sterling honesty from the followers of practical science, and they were formed into a society, whose functions should be somewhat analogous to those of the heralds in the days of chivalry (as far as regards their granting to recreant knights an abatement of arms, which future good conduct was alone able to obliterate), there would be a power well able to interpose between the aggrieved and the aggriever, and admirably fitted to hold up the latter to deserved contempt.

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* Should the truth of this theory be questioned, we have only to say that we know of none other which will answer to the cases within our own personal experience.

In suggesting the propriety of founding a society which should form, as it were, a Court of Appeal, for discussing matters connected with the rights of inventors, with a view to their protection therein, it must not be supposed that we are at present prepared with the detail of its constitution, or with a code of laws suitable for its use. We would, however, in order to curb the vein of ridicule which the novelty of the proposition might, in some quarters, give rise to, direct attention to the practical working (in a somewhat contracted sphere certainly) of this principle, which, we conceive, may be made to bear upon the whole manufacturing industry of the country.—It is well known, that within these few years the great encouragement given by the landed aristocracy to the cultivation of the soil has induced the display of a considerable amount of ingenuity on agricultural implements. The advantages resulting to the farmer from the use of these implements suggested the idea of granting prizes (at the various agricultural meetings) to the best of those which should be put in competition; and as the appointed judges were, in general, the most competent to decide upon the qualities of the implements, it soon followed that only those which carried off the prizes met with a ready sale. Thus the judges indirectly attained a power which they were not slow in bringing to good use; for, when they are shewn that the superiority of one maker's implement is owing to his having appropriated the invention of another, he is made to understand that the prize cannot be his. Now, we are in a position to know that this negative condemnation of a practice which is too often considered a venial offence has had a most salutary effect in preventing the invasion of patentees' rights, as far as this branch of industry is concerned; and so much of a security is it felt by agricultural implement-makers to be, that in many cases they are content with registering inventions, in the full knowledge that it gives them no security, merely for the sake of proving that at a certain date they were in possession of the invention, and therefore were the first to introduce it. In this wholesome supervision there are no inquisitorial investigations which can offend, for the competition is voluntary, and, if disliked, could be easily avoided. We do not say, that under such a system as that on which the agricultural societies are founded our Court of Appeal could be worked; but if two contending parties were desirous of a just and honest settlement of their rights, we think that instead of the expensive and cumbrous machinery of the law, they would, in many cases, gladly avail themselves of the opportunity which a central Court of Appeal, consisting wholly of men of practical science, would afford, of referring their grievances for arbitration; while, if success attended the operations of the Court, a means would be opened to the poor inventor (who is too often marked out as a sure prey), of maintaining his rights; whereas, at present, if unassisted by some capitalist, the protection held out to him by the law is but a mockery. The moral weight of a decision from such a quarter would be far greater than where, by the intricacies of the law, a variety of ingenious feats may be played off, sufficient to obtain a judgment which, at a new trial, it would be found necessary to reverse. We would not have it understood, that in the development of our scheme we contemplate the least infraction of the legitimate duties of the bench or of the bar; for, if the members of the Court of Appeal (mere novices as they must be in legal matters) were to take upon themselves the administration of *justice,* in its legal sense, it would be as great a piece of folly as was perpetrated by those sapient legislators who concocted the act for conferring the power of judicating on infringements of registrations upon justices of the peace and that illustrious body which sways the destinies of "the great metropolis." Our meaning is simply this, that—instead of treating infringers of patent property like felons, as in France, or giving them all the advantages which the aggrieved party's dread of an expensive lawsuit too often furnishes in England—the condemnation, by a competent body, of any person whose acts connected with the manufacturing arts bore the construction of dishonesty, should subject him to a virtual banishment from the society of his fellows. This punishment would not only meet the case of many palpable and determined infringements cognizable by the courts of laws, but could also be judiciously administered where no legal appeal is of avail: such as the surreptitious possession of a foreign invention, and others which will readily suggest themselves. Thus the intrinsic marketable value of discoveries and inventions would, from the comparative rarity of invasions of patent property, necessarily increase,—a strong inducement to many for at least a trial of the Court of Appeal; but, far beyond this no slight advantage would be the public admiration for a class of men who, despising all the cunning craft which might subserve for immediate personal gain, had, as with one consent, determined to shew the world that wealth attained by the loss of honor was too dear a purchase. Nothing would then be wanting to the elevation, in the social sphere, of those whose labors have so successfully advanced England's commercial prosperity; for among them posterity would more plentifully because more certainly draw worthy names which would be gratefully enrolled among the lasting benefactors of mankind.

On the tendency of molecules to unite and form aggregations and groups of an organisation more or less perfect, producing the various bodies which exist in nature; with an attempt to explain these facts simply by the laws of Newtonian attraction.

BY M. SÉGUIN.

[Translated for the London Journal of Arts.]

PHILOSOPHERS, in their researches into the causes of the tenacity with which the molecules of bodies adhere together, have invariably been met by two difficulties. The first was, that they could not conceive how any two of the molecules forming any solid body, when placed in contiguity, should have any greater attraction for each other than the earth for one of them; and it has been suggested, in explanation of this fact, that the law of attraction undergoes modification in proportion as the distance between the two molecules is lessened. But, supposing this first question solved, there still remained another to be explained, viz., why the molecules, free to obey the influence of attraction, have not an indefinite tendency to concentrate at the common centre of gravity, since there is nothing to prevent them from gradually approaching each other, as is the case in the planetary system, in which gravity and centrifugal force counterbalance each other, and maintain the celestial bodies at certain relative distances, from which they cannot deviate? In order to explain this second fact, which it was imagined could not be accounted for by the law of universal attraction, it has been supposed that the caloric interposed between the molecules of bodies, served to maintain that position of the molecules in the same manner as centrifugal force in the movement of the celestial bodies. It was for the purpose of ascertaining whether there was a means of tracing all these phenomena to the laws of universal attraction, that I undertook the work which I now submit to the Academy.

The action which a mass of molecules exerts upon a similar mass with which it may be brought in contact, may be regarded in two ways; firstly, considering the two masses as each concentrated at their centres of gravity, and acting one upon the other in direct ratio to their masses and inversely to the square of their distance apart; and, secondly, supposing them to be formed by the aggregation of very dense and small molecules, and, consequently, having between them spaces infinitely larger than those they occupy.

It is evident that, in the first instance, all the molecules composing each of the two masses, and which we will assume to be spherical, might be supposed to be concentrated at a point situated at their respective centres of gravity; and, designating their mass and the distance separating them by unity, their action will be explained by $\frac{1}{(1)^2}$. If now, each sphere be supposed to be formed by the combination of twelve rows of 60 molecules each, arranged in a radial form internally, at an inclination of 60 degrees to each other; and if their ends be united by other rows, composed also each of 60 elements, a regular figure will be produced, designated in mineralogy, a *cubo-octahedron;* which name indicates that the primitive form may be considered either as a cube or an octahedron, and may be included within a sphere which it will touch at twelve points.

On abstracting, for the sake of simplicity, those molecules which are superposed in the angles, it will be found that their number is, for one of the bodies, equal to 2160, and that, consequently, the attraction of one of these molecules upon its neighbour will be expressed by $\frac{\frac{1}{2160}}{\frac{1}{(120)^2}} = 6,66$; that is to say, that the two molecules, by reason of their excess of density and greater proximity to each other, will exert a power 6,66 times greater than that of the two entire spheres upon each other. But, in order to make the comparison in a complete manner, it would be necessary to add to this quantity the reciprocal attractions exerted upon one another by all the molecules composing the row, and preceding or following that which is especially under consideration, and also those of all the other molecules which are disseminated throughout the two bodies; which calculation would only furnish approximate results.

If, instead of 60 molecules, we suppose the spheres to be formed by a combination of rows containing 600,000, each molecule would exert upon its neighbour an attraction equal to $\frac{\frac{1}{21,600,000}}{\frac{1}{(1,200,000)^2}} = 66666$; which shews, as might have been easily foreseen, that the attraction between the molecules, compared with that existing between the two masses, augments in direct ratio to the increase of the distance between the masses. Besides, as the rows may be supposed to be composed of any number of molecules, however large, it follows, that a body may be supposed to be of such a constitutive form, that the attraction of one of its component molecules exerts upon its neighbour a greater attraction than would be exerted upon such molecule by any other body, formed of the same substance, whatever might be its bulk or extent of surface.

This principle being laid down, and bodies being considered as constituted according to these conditions, I have endeavoured to determine the intensity of the attractive forces of a substance in the state of division in which it would be, when, by reason of the chemical reaction which takes place between substances of different natures dissolved in water, a solid body is formed, and becomes apparent in the midst of the liquid. For this purpose, I have constructed an apparatus intended to measure the space traversed by the molecules (at the moment they appear in a solid state in the liquid) from the point at which the attraction of each of the centres of action ceases, to that at which they form one of the flaky nuclei, which, united, constitute the precipitate (each of these centres of action being considered as a mass acting on the most distant molecules, by reason of the attraction which they possess); the space which this small body causes the molecules to traverse in a given time, being compared with that which the earth would cause a body on its surface to traverse in the same time.

As I wished to operate upon a precipitate which should not be formed too quickly, I chose that which is formed by dissolving soap in water containing sulphate of lime in solution; and for this purpose I used a small vessel, having a transparent bottom (placed in the focus of the parallel rays of my set of glasses, and intended in my apparatus to receive the liquid to be experimented upon), into which I put water, holding in solution a thousandth part of its weight of sulphate of lime, and immersed therein a small piece of soap. In a space of time which appeared to me less than a second, a flaky precipitate was formed, composed of opaque and transparent particles alternately, and consisting of very fine loose fibres, the respective positions, form, and dimensions of which did not vary perceptibly, if at all, during the short space of time I left them untouched. To ascertain the extent and determine the bulk of the aggregations which had been formed by the combination of the molecules at each centre of action, I measured, by means of my apparatus, the distance from centre to centre of the adjacent light and dark parts of the precipitate; which distance I found, by observation, to be 2^{mm}, 36, representing the face of a small cube, containing the solid matter grouped at the centre of action, and representing the volume of a sphere of about 3 millimetres in diameter. If we designate the volume of this little mass by unity, it will be found, by calculation, that that of the earth will be expressed by the number 7641×10^{25}; but as the water only contained in solution a thousandth part of its weight of solid matter, of a density about half that of the earth, the above result must be again multiplied by 2000, which brings it in the relation of 1 to $15{,}282 \times 10^{28}$.

Lastly, we arrive at the amount of attraction by dividing the above quantity by the square of the amount of the rays of the small body, and those of the earth ; as, for instance, 18×10^{18} which gives 8487×10^{9}. And as the earth causes the bodies on its surface to traverse a space of about 5 metres in the first second of their fall, it follows that the small body, acting according to the same laws upon the molecules, should cause them, in the same space of time, to run through only a space equal to 5 metres divided by the above number, viz., $\frac{1}{16947 \times 18^{8}}$ of a metre, or, in decimals, the number 6029 preceded by twelve noughts. But the space traversed by the molecule in one second is evidently equal to half of that which was occupied by the transparent water which separated two of the small agglomerations of matter from one another; and I have found, by several observations, that this space was 0^{mm}, 6, that is to say, seventeen hundred billions of times greater than if the attraction of the small body upon the molecule had only been the result of all its component parts, considering them as concentrated at their centre of gravity.

It may be presumed, with every appearance of certainty that it is possible to have in such a matter, that at the moment when the nature of the divers substances in solution in water had determined the formation of a solid body in the form of a precipitate, the molecules of this latter,—supposing their smallness and density to be very considerable, as considerable as it is possible to imagine them,—had a tendency to unite and form a network of very fine loose fibres, the molecules of which, acting upon each other with great energy, produced a speed towards the centre of action, much greater than they would have done on the supposition that they were all united at the centre of gravity.—[*Comptes Rendus.*]

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ON THE MODIFICATIONS WHICH TARTARIC AND PARATARTARIC ACIDS UNDERGO UNDER THE INFLUENCE OF HEAT.

BY M. AUG. LAURENT AND CH. GERHARDT.

According to M. Fremy, tartaric acid, before losing all its water by the action of heat, and becoming anhydrous, passes through two intermediate states, thereby forming two acids differing from tartaric acid as regards capacity of saturation.

We find that tartaric acid may undergo modification without loss, and consequently without change in its component parts. To demonstrate this, take a given weight (say a gramme) of tartaric acid, and heat it carefully to such a degree as to fuse it, but not to exceed that point, and it will be found that it will have undergone a change without losing one-thousandth part of its weight. The product will be a mixture of two acids isomeric with tartaric acid.

One of them, confounded by M. Fremy with tartaric acid, possesses the same capacity of saturation. We have given it the name of *metatartaric acid.* Like tartaric acid, metatartaric acid furnishes crystallizable salts, which are distinguishable from the corresponding tartrates by their form and their greater solubility. The bisalts of ammonia $C^4H^5Am.O^6$, and the neutral salts of lime $C^4H^4Ca^2O^6+4Aq$, possess this characteristic most particularly. As far as can be ascertained by the microscope, metatartrate of lime appears hemihedrous; it is therefore probable that metatartric acid and metatartrates will act upon polarized light in the same manner as tartaric acid and tartrates. Besides, they are converted into these latter bodies by ebullition.

The other acid, which we have donominated *isotartaric,* is produced in greater or less quantity according to the duration of fusion of the tartaric acid. It possesses this remarkable characteristic, viz., that its neutral salts have the same composition as bitartrates. Thus, in this modification, the tartaric acid has changed its capacity of saturation without altering in composition, the only change being a molecular transposition.

On heating the solution of neutral isotartrate of lime $C^4H^5CaO^6$, which is an extremely soluble and uncrystallizable salt, it becomes acid, and is converted into crystallized neutral metatartrate of lime and metatartaric acid. In the same way the solution of isotartrate of ammonia, on the application of heat, is converted into bimetatartrate of ammonia, without freeing the ammonia; these two salts are isomeric; their composition being $C^4H^5Am.O^6$.

It is curious to observe this retrocession, in the tartrates, of the isomeric molecules of isotartrates and metatartrates, under the influence of heat, that is to say, of the same agent which produced them, only applied under other circumstances.

If instead of merely melting the tartaric acid it be heated to such a degree as to disengage water and expand, it becomes converted into a third acid, containing all the elements of tartaric acid, minus one equivalent of water, viz. $C^4H^4O^5$. This acid, which is very soluble in water, and even deliquescent, furnishes salts the composition of which is represented by that of the bitartrates, minus one equivalent of water. It is evidently the same as that of which M. Braconnot describes the characteristics, and which M. Fremy calls *tartrelic acid.* Its reactions are very remarkable. The insolubility of its salt of lime $C^4H^3CaO^5$, is so great that it clouds acetate of lime in solution so dilute as not to be affected by metatartrates, nor even by tartrates; and this is not removed by ammonia. But on first saturating the acid with ammonia, the acetate of lime will no longer form a precipitate, even if the solution be very strong; as the ammonia and potash immediately convert M. Braconnot's acid into isotartrate, the salt of lime of which is very soluble. We have even based upon this reaction a very advantageous process for obtaining isotartrates in a state of purity.

This experiment is interesting, inasmuch as it demonstrates the maintenance of the capacity of saturation of an acid, notwithstanding the assimilation of the elements of water. But of what acid? Of the acid which has precisely the same component parts as the pretended anhydrous tartaric acid; so that, according to dualism, the conclusion arrived at is, that anhydrous tartaric acid is both an anhydrous and a hydrated acid. Is not this a conclusive proof of the fallacy of dualistic doctrines, when they attribute to what is called water of hydratation the determinative cause of the capacity of saturation of acids? Here again we are at variance with M. Fremy's experiments. According to that chymist, soluble swollen acid (his tartrelic acid) would be converted into insoluble anhydrous acid, with a further loss of water. We are prepared to affirm that this metamorphosis is also merely isomeric, as we have satisfactorily proved by weighing. It is not, besides, unique in science: we will amongst others mention the two changes of metaphosphate of soda, one of which is insoluble in water, and the other very soluble, even deliquescent. This is absolutely the case with the two anhydrides furnished by tartaric acid. We may add that paratartaric acid has given us a series of modifications similar to those of tartaric acid.—[*Ibid.*]

COMMON SALT.

The amount of common salt in all the oceans is estimated by Schafhæutl at 3,051,342 cubic geographical miles. This would be about five times more than the mass of the Alps, and only one-third less than that of the Himalaya. The sulphate of soda equals 633,644·36 cubic miles, or is equal to the mass of the Alps. The chloride of magnesium, 441,811·80 cubic miles; the lime salts, 109,339·44 cubic miles. The above supposes the mean depth to be but 300 meters, as estimated by Humboldt. Admitting with Laplace, that the mean depth is 1000 meters, which is more probable, the mass of marine salt will be more than double the mass of the Himalaya.—[*Amer. Jour.*]

ON THE MANUFACTURE OF PURE SULPHURIC ACID.

BY AUG. A. HAYES.

In the arts the rapid extension given to refined operations has led to the consumption of pure chemical products. Applications of such substances as were formerly only in the hands of accurate chemists are now of daily occurrence in manufacturing. The want felt for pure sulphuric acid has, to a certain extent, been supplied by the Nordhausen acid; but aside from a higher price restricting its consumption, the manufacture is foreign to this country.

Without entering into scientific details I shall describe an economical process which I have carefully studied, and by which the pure acid, used in my laboratory, has long been obtained.

In the manufactories of sulphuric acid, the weaker acid from the lead chambers is concentrated in lead pans, usually to the density of 1·76, and transferred, without cooling, to the platinum alembics for further concentration.

The modification commences with the hot acid, and it may be supposed to contain suphurous acid, hydrochloric acid, hyponitric acid, arsenous acid, oxides of iron and lead, alumina, lime, soda and organic matter, although the acid obtained from the combustion of Sicily sulphur, is rarely thus impure. On adding to the hot acid sufficient nitrate of potash, or soda, to destroy the organic matter, the brown color disappears and the fluid becomes colorless. The addition of $\frac{1}{500}$ of sulphate of ammonia, removes the remaining hyponitric acid; much of the hydrochloric acid has been removed by the nitrate, and sulphurous and arsenous acids carried to their highest stage of oxidation. The oxides present, aid the further purification; by continuing the concentration to 1·78. a trifling addition of oxide of lead is made, but it is essential to the success of the process that this point of density be reached. The fluid must now be cooled in deep vessels of lead, the temperature of it being gradually reduced to 32° F., and allowed to become perfectly clear. The clear part must then be run into shallow lead vessels, so placed that they may be refrigerated to 0 Fahr. As the whole acid has nearly the hydrate composition of $SO_3 \times 2HO$, it would form by repose a solid crystalline mass. In ordinary cases, the regular crystals form solid masses, which are allowed to increase, till one-half the bulk of the fluid has assumed the solid state, when the remaining liquor is rapidly removed, the crystals broken up and washed with some acid resulting from the crystals of a former operation.

When crystallized in this way, nearly all the contamination which can be detected, arises from the fine granular sediment of anhydrous sulphates and arseniates of iron and lead, mixing with the crystals from careless washing. These substances are deposited in the cooling, but more abundantly in the course of the crystallization of this acid. The crystals melted in lead kettles which have been recently washed with ordinary sulphuric acid, afford an acid nearly pure, and if required in the concentrated state, may be transferred directly to the platinum alembic, melted, and boiled. For the most delicate researches, the crystals must be melted in glass or stone-ware, re-crystallized out of contact with metals or dust, leaving one-half or one-third of the acid in a fluid state. If the subsequent use of the acid does not require the removal of the water, which is very rarely the case, the crystals being a perfectly definite hydrate when fluid, enable us to weigh and apportion the quantity of real acid with great precision.

In the laboratory, when used for cases of difficult decomposition, it may be added to the crystallized bisulphate of potash, mixed with the substance to be acted on, and the whole brought to any state of dryness in the platinum utensils employed in such operations.

All the acid from which the pure acid has been abstracted, may be used for generating nitric, or hyponitric acid, in the manufacture of sulphuric acid. The manufacture may best be carried on during the winter months, and the crystals obtained, stored, or melted.

This hydrate is remarkable for the regularity and great size of its crystals. They are oblique four-sided prisms, and often present faces of twelve by sixteen inches. Their capacity for heat is also surprising; small parcels exposed at the mean temperature of 46° F., melt with extreme slowness.—[*Silliman's Amer. Jour.*]

LIST OF REGISTRATIONS EFFECTED UNDER THE ACT FOR PROTECTING NEW AND ORIGINAL DESIGNS FOR ARTICLES OF UTILITY.

1848.

Sept. 29. *William Rowan*, of the York-street Foundry, Belfast, engineer, for a fluctuating slider.

30. *James Moore Martin*, of 12, Chatham-place, Walworth, London, for a protector, or railway travelling cap for ladies and gentlemen.

30. *Alfred Augustus de Reginald Hely*, of 21, Manchester-buildings, Westminster, for a portable gaseous liquid fountain.

Oct. 2. *George Chambers & Co.*, of Priory Mills, Studley, Warwickshire, for a holder for crochet or tambour needle, a piercer, or other similar articles.

3. *Thomas Rontree*, of 8, Leicester-street, Liverpool, and *A. & R. Brown*, of 58, Waterloo-road, Liverpool, brass-founders, for an improvement in stand and other pipes used for the conveyance of fluids.

4. *Prosper Alexandre Lambert*, of No. 10, Bedford-street, Covent Garden, Middlesex, and of Passage de l'Entrepôt des Marais, at Paris, in France, civil engineer, for improvements in the shape or configuration of mechanical or artificial leeches, and the lancets used therewith.

5. *George Frederick Morrell*, of 149, Fleet-street, for an abutment, applicable to all arches and brestsummers.

6. *John Coney*, of 75, Stafford-street, Birmingham, for an instrument for crochet and tambour work.

Oct. 6. *Henry Mc Evoy*, of Birmingham, for an eye (hook and eye).

6. *Thomas Walley*, of 17, Hulme-street, Salford, for a postage stamp and label affixer.

7. *H. Crosley & Samuel Galsworthy*, of Emerson-street, Southwark, engineers, for an improved gas exhauster.

7. *Harrild & Sons*, of Great Distaff-lane and Friday-street, London, printers' roller makers, joiners, and appraisers, for printing apparatus.

7. *David Walsh*, of Little Govan, Glasgow, mechanic, for a fork for weft protector.

9. *Thomas Drew*, of Plymouth, chemist, for the chemical sanitary belt and cholera repellent.

10. *Ralph Wedgwood*, of Rathbone-place and Lombard-st., London, for a clip desk, for holding down the leaves of the copy book when using Wedgwood's patent manifold writer.

10. *Robert Bedington*, of Birmingham, for a knob for latches and catches.

10. *E. M. Hanford*, of Hathern, near Loughborough, for a double-acting draught tackle.

11. *Alfred Wilson*, of 17, Percival-street, Clerkenwell, for a pair of silent shears.

12. *Joseph Tylor & Son*, of Warwick-lane, Newgate-street, braziers, &c., for an improved water-closet valve.

12. *Richard Brotherton*, of 3, Cross-street, Preston, for a railway safety signal telegraph.

13. *James Marr, John Gallie, & Co.*, of Upper Wellington-street, Covent Garden, *London*; New-st., *Edinburgh*, and Lower Liffey-street, *Dublin*, type-founders and printers' joiners, for improved *script* type.

13. *Welch & Margetson*, of 134, Cheapside, for a "Poncho" wrapper.

14. *George Frederick Bowers*, of Brownhills, Burslem, Staffordshire, china manufacturer; *Thomas Betteney*, of Longton, Staffordshire, china manufacturer; and *Edward Challiner*, of Tunstall, Staffordshire, earthenware manufacturer, for a magnetic slip and glaze trough.

16. *J. Presland*, of 42, Charlotte-street, Blackfriars-road, for a hat band.

17. *Alexander Chaplin*, of Barnes-street, Limehouse, engineer, for a portable blacksmith's hearth.

17. *George Fitt*, of Bishopsgate, London, for a package for lard.

17. *William Middleton*, of Birmingham, for a spring for buffers and draw-bars of railway carriages.

18. *John & James Mc Rae*, of 17, Ave Maria lane, London, for an inkstand.

Oct. 18. *W. & T. Avery*, of Birmingham, for a weighing machine.

18. *Capper & Waters*, of 26, Regent-street, for the "Tasca collar."

19. *C. Rowley*, of 23 and 24, Newhall-street, Birmingham, for a handle for umbrellas, parasols, whips, and walking-sticks.

19. *Benjamin Verity*, of King-st., Covent Garden, London, and *John Coope Haddan*, of 14, Lincoln's-Inn-Fields, London, for a gas-burner.

19. *Henry Pershouse*, of Birmingham, for an inkstand.

20. *W. B. Moffatt*, of 9, Spring-gardens, for a diaphragm double sewer, for separating or combining house drainage and surface drainage.

20. *Joseph Rodgers & Sons*, of 6, Norfolk-street, Sheffield, for a spring-tang table knife.

20. *Stephen Green*, of Princes-street, Lambeth, for parts of a water-closet.

21. *William Kirkwood*, of West Thistle-street-lane, Edinburgh, for a piston-cock for water-closets.

21. *William Southam*, of the Mills, Nuneaton, Warwickshire, for a self-acting air conductor and ventilator for mill-stones.

23. *Ellis Rowland*, of 5, York-street, Belfast, of the Belfast and Ballymena Railway, for a high-pressure steam-gauge and self-acting blast regulator, applicable to the boilers and flues of steam-engines.

23. *John Roberts*, of 34, Eastcheap, London, for a horticultural double tile, with divided sockets to insert therein.

24. *John Thomas Tucker*, of 3, Upper Paul-street, Exeter, for a universal brooch protector.

24. *James Dubois*, of 5, Poulton-terrace, King's-road, Chelsea, appraiser and house agent, for the "annulus capus," or elastic ferrule or wrapper for taps.

24. *Marius Pierre Philip Bourjeaurd*, of Davies-street, Grosvenor-square, London, surgeon, for an elastic suspensor.

24. *John Axon Barnett*, of Salford, Lancashire, painter, for the "treble symbolic indicator."

25. *Charles Parker*, of Birmingham, for a whip-holder.

26. *Richard Walker*, of Birmingham, for a fastening for dress.

27. *William Bowler*, of 112, Cannon-street, Manchester, for a ventilating hat-tip.

28. *John Mather*, of Newcastle-on-Tyne, for a stove.

28. *William Edward Jenkins*, of 37, Broad-street, Golden-square, for the "preserver envelope."

List of Patents

That have passed the Great Seal of IRELAND, from the 17*th September to the* 17*th October,* 1848, *inclusive.*

To William Southam, of Nuneaton, in the county of Warwick, miller, for improvements in corn-mills, or in machinery for pulverizing corn and other grain or seeds.—Sealed 4th October.

Thomas Marsden, of Salford, in the county of Lancaster, machine-maker, for improvements in machinery for dressing or combing flax, wool, and other fibrous substances.—Sealed 11th October.

John Scoffern, of Upper Holloway, M.B., for improvements in the manufacture and refining of sugar.—Sealed 11th October.

Charles Low, of Dalston, in the county of Middlesex, Gent., for improvements in the manufacture of copper.—Sealed 14th October.

List of Patents

Granted for SCOTLAND, subsequent to September 22*nd,* 1848.

To Robert Thomson Pattison, of Glasgow, printer, for an improved preparation or material for fixing paint or pigment colors on cotton, linen, woollen, silk, and other woven fabrics. —Sealed 26th September.

William Southam, of Nuneaton, miller, for improvements in corn-mills, or in machinery for pulverizing corn and other grain or seeds.—Sealed 26th September.

William Losh, of Newcastle-upon-Tyne, for improvements in steam-engines.—Sealed 26th September.

James Petrie, of Rochdale, engineer, for certain improvements in steam-engines.—Sealed 27th September.

Thomas Spencer, of Prescot, earthenware manufacturer, for certain improvements in machinery or apparatus for manufacturing pipes or tubes from clay or other plastic materials; part or parts of which improvements are applicable to the manufacture of hollow earthenware.—Sealed 27th September.

John Davie Morries Stirling, of Black Grange, N. B., for improvements in the manufacture of iron and metallic compounds. —Sealed 2nd October.

George Royce, of Fletland, Lincolnshire, miller, for improvements in machinery or apparatus for depositing, cleansing, and grinding corn and seed; also in apparatus for dressing the meal or flour made from wheat and other grain.—Sealed 2nd October.

William Sager, of Rochdale, wool-dealer, for certain improved means and apparatus for effecting the transit or conveyance of goods, passengers, and correspondence by land or water, and for other such purposes; part or parts of which means and apparatus constitute a new and improved method of generating steam; which improvement is applicable to other purposes to which steam is generally applied as a motive power.—Sealed 3rd October.

Richard Coad, of Kennington, Surrey, chemist, for improvements in the combustion of fuel, and in applying the heat so obtained.—Sealed 6th October.

Andrew Paton Halliday, of Manchester, manufacturing chemist, for certain improvements in the manufacture of pyroligneous acid.—Sealed 10th October.

William Wilkinson Nicholson, of Acton-street, Gray's-inn-road, London, civil engineer, for improvements in machinery for compressing wood and other materials requiring such a process.—Sealed 10th October.

Alonzo Buonaparte Woodcock, of Manchester, for improvements in steam-engines, and in apparatus for raising, forcing, and conveying water and other fluids.—Sealed 13th October.

New Patents
SEALED IN ENGLAND.
1848.

To Thomas Metcalfe, of High-street, Camden Town, in the county of Middlesex, Gent., for improvements in the construction of chairs, sofas, and other articles of furniture for sitting and reclining on. Sealed 5th October—6 months for inrolment.

Edward John Massey, of Liverpool, for improvements in apparatus for measuring the speed of vessels and streams, and for ascertaining the depths of water. Sealed 5th October—6 months for inrolment.

Joseph Sharp Bailey, of Bradford, in the county of York, spinner, for certain improvements in preparing, combing, and drawing wool, alpaca, mohair, and other fibrous materials. Sealed 5th October—6 months for inrolment.

Elias Robison Handcock, of No. 16, Regent-street, London, and Rathmoyle House, Queen's county, Ireland, Esq., for certain improvements in mechanism applicable to impelling and facilitating the propulsion of vessels in the water; which improvements are applicable to locomotive engines for railways, and other similar purposes. Sealed 12th October—6 months for inrolment.

John Ashby, of Carshalton, in the county of Surrey, miller, for certain improvements in machinery applicable to cleaning grain and dressing meal. Sealed 12th October—6 months for inrolment.

Daniel Watney, of Wandsworth, in the county of Surrey, distiller, and John James Wentworth, of the same place, for improvements in machinery for drilling metals and other substances. Sealed 12th October—6 months for inrolment.

John Wright, of Camberwell, in the county of Surrey, engineer, for improvements in generating steam and evaporating fluids. Sealed 12th October—6 months for inrolment.

Charles de Bergue, of Arthur-street West, in the city of London, engineer, for improvements in bridges, girders, and beams. Sealed 12th October—6 months for inrolment.

Arthur Dunn, of Dalston, chemist, for improvements in ascertaining and indicating the temperature and pressure of fluids. Sealed 12th October—6 months for inrolment.

John Davie Morries Stirling, of Black Grange, N. B., Esq., for improvements in the manufacture of iron and metallic compounds. Sealed 12th October—6 months for inrolment.

Samuel Cunliffe Lister, of Manningham, in the county of York, Gent., for improvements in preparing hackling and combing wool and other fibrous substances. Sealed 19th October—6 months for inrolment.

Frank Clarke Hills, of Deptford, Kent, manufacturing chemist, for improvements in treating certain salts and gases or vapors. Sealed 19th October—6 months for inrolment.

Robert Angus Smith, of Manchester, for improvements in the application and preparation of coal tar. Sealed 19th October—6 months for inrolment.

Robert William Sievier, of Upper Holloway, in the county of Middlesex, Gent., for improvements in the means of warping and weaving plain and figured fabrics. Sealed 19th October—6 months for inrolment.

Joseph Eugene Asaert, of Lille, in the Republic of France,—machinist, for improved means of obtaining motive power. Sealed 19th October—6 months for inrolment.

William Brown, of Cambridge Heath, in the county of Middlesex, weaver, for improvements in manufacturing elastic stockings and other elastic bandages and fabrics. Sealed 26th October—6 months for inrolment.

Soren Hjorth, of Jewry-street, Aldgate, in the city of London, for certain improvements in the use of electro-magnetism, and its application as a motive power, and also other improvements in its application generally to engines, ships, and railways. Sealed 26th October—6 months for inrolment.

James Clark, of Glastonbury, in the county of Somerset, manufacturer, for improvements in the manufacture of boots, shoes, and clogs. Sealed 26th October—6 months for inrolment.

William Longmaid, of Beaumont-square, Middlesex, Gent., for improvements in treating the oxides of iron, and in obtaining products therefrom. Sealed 26th October—6 months for inment.

William Church, civil engineer, and Thomas Lewis, woollen-draper, both of Birmingham, in the county of Warwick, for a certain improvement, or certain improvements, in machinery to be employed in making playing and other cards, and also other articles made wholly or in part of paper or pasteboard; part or parts of which said machinery may be applied to other purposes where pressure is required. Sealed 26th October—6 months for inrolment.

Peter Fairbairn, of Leeds, in the county of York, machine-maker, for improvements in machinery for heckling, carding, drawing, roving, and spinning flax, hemp, tow, silk, and other fibrous substances. Sealed 26th October—6 months for inrolment.

James Burrows, of Haigh, near Wigan, in the county of Lancaster, engineer and draughtsman, and George Holcroft, of Manchester, in the same county, consulting engineer, for certain improvements in, and applicable to, steam-engines—in the machinery or apparatus belonging thereto—in the construction and arrangements of boilers for the generation of steam—and in the furnaces and flues used in connection therewith, parts of which improvements are also applicable to other similar purposes.—Sealed 26th October—6 months for inrolment.

CELESTIAL PHENOMENA FOR NOVEMBER, 1848.

D.	H.	M.	
1			Clock after the ☉ 16m. 16s.
	—		☽ rises 11h. 30m. M.
	—		☽ passes mer. 3h. 57m. A.
	—		☽ sets 8h. 26m. A.
2	2	51	Pallas in conj. with the ☉
4	6	30	☽ in □ or first quarter
4	16	0	Juno stationary
5			Clock after the ☉ 16m. 14s.
	—		☽ rises 1h. 57m. A.
	—		☽ passes mer. 7h. 14m. A.
	—		☽ sets Morn.
	11	37	♃'s second sat. will im.
6			Occul. 96 Aquarii im. 9h. 13m.
7			Vesta stationary
7	11	17	☿ in conj. with Ceres, diff. of dec. 4. 51. S.
7	14	28	♃'s first sat. will im.
	18	55	☿ in conj. with Pallas, diff. of dec. 21. 41. S.
8	13	41	♅ in conj. with the ☽ diff. of dec. 1. 56. N.
	22	29	☿ in the ascending node
9			Occul. ζ^1 Ceti, im. 11h. 20m. em. 11h. 56m.
	—		Transit of Mer. vis. at Greenwich
	1	42	☿ in inf. conj. with the ☉
10	18		☽ in Perigee
11			Occul. 75 in Tauri, im. 16h. 55m. em. 17h. 44m.
	—		Occul. θ^1 in Tauri, im. 17h. 3m. em. 17h. 35m.
	—		Occul. A.S.C. 516, im. 17h. 41m. em. 18h. 37m.
	—		Occul. α Tauri, im. 19h. 55m. em. 20h. 28m.
	1	35	Ecliptic oppo. or ○ full moon
	16	28	Ceres in conj. with the ☉
12			Occul. 111 Tauri, im. 13h. 3m. em. 13h. 59m.
	14	16	♃'s second sat. will im.
13	6	39	♃ in □ with the ☉
	8	35	☿ in conj. with ♂ diff. of dec. 1. 13. N.
	12	3	☿ in Perihelion
14	16	21	♃'s first sat. will im.
15			Clock after the ☉ 14m. 59s.
	—		☽ rises 10h. 11m. A.
	—		☽ passes mer. 4h. 42m. M.
	—		☽ sets 0h. 15m. A.
16			Occul. ζ Leonis, im. 19h. 14m. em. 20h. 26m.
16			Mercury R.A. 14h. 34m. dec. 13. 4. S.
	—		Venus R. A. 17h. 34m. dec. 24. 43. S.
	—		Mars R.A. 14h. 48m. dec. 15.59. S.
	—		Vesta R. A. 23h. 39m. dec. 12. 29. S.
	—		Juno R. A. 5h. 49m. dec. 0. 27. N.
	—		Pallas R. A. 15h. 19m. dec. 3. 23. N.
	—		Ceres R. A. 15h. 21m. dec. 14. 25. S.
	—		Jupiter R. A. 9h. 37m. dec. 14. 56. N.
	—		Saturn R. A. 23h. 21m. dec. 6. 38. S.
	—		Georg. R. A. 1h. 11m. dec. 6 51. N.
	—		Mercury passes mer. 22h. 47m.
	—		Venus passes mer. 1h. 52m.
	—		Mars passes mer. 23h. 4m.
	—		Jupiter passes mer. 17h. 52m.
	—		Saturn passes mer. 7h. 37m.
	—		Georg. passes mer. 9h. 26m.
17	1	42	♃ in conj. with the ☽ diff. of dec. 3. 9. N.
	6	47	☽ in □ or last quarter
	9	54	♀ in Aphelion
18	1	14	☿ stationary
19	17	22	♃'s second sat. will. im.
20			Clock after the ☉ 14m. 6s.
	—		☽ rises 1h. 31m. M.
	—		☽ passes mer. 7h. 54m. M.
	—		☽ sets 2h. 6m. A.
	—		Vesta greatest hel. lat. S.
21	18	43	♃'s first sat. will im.
22	0	36	♄ stationary
23	12	43	♃'s first sat. will im.
23	12	45	☿ in conj. with the ☽ diff. of dec. 1. 36. S.
	20		☿ greatest hel. lat. N.
24	11		☽ in Apogee
25			Clock after the ☉ 12m. 41s.
	—		☽ rises 6h. 45m. M.
	—		☽ passes mer. 11h. 33m. M.
	—		☽ sets 4h. 16m. A.
25	9	30	Ecliptic conj. or ● new moon.
26	0	27	☿ greatest elong. 20. 0. W.
28	10	6	♀ in conj. with the ☽ diff. of dec. 6. 25, S.
30	14	36	♃'s first sat. will im.

Note.—Transit of Mercury, Nov. 8—9, visible at Greenwich.

First contact of limbs	Nov. 8th,	23h. 1m. 40s.	Mean Time at Greenwich.
Least distance of centres, 2′ 45″	„ 9th,	1h. 44m. 6s.	
Last contact of limbs	„ 9th,	4h. 26m. 36s.	

J. LEWTHWAITE, Rotherhithe.

THE
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CONJOINED SERIES.

No. CCIV.

RECENT PATENTS.

To William Irving, *of Trigon-road, Kennington, engineer, for improved apparatus for cutting or carving ornamental forms in wood, stone, and other materials.*—[Sealed 23rd February, 1848.]

This invention consists in a certain novel arrangement or construction of apparatus or machinery (consisting of known parts) for cutting or carving ornamental forms in wood, stone, or other materials. The object of this novel arrangement or construction of machinery is to obtain, under the command of the operator, such a movement of the cutting tool as will admit of its following any curve or straight line that shall be required to produce the work, without moving the table whereon the material to be wrought is fixed, either in a circular direction, on a centre, or sliding it transversely, as heretofore has been found necessary, in order to bring all the parts of the surface under the operation of the cutter, where the pattern to be wrought extended both in breadth and length. In this arrangement the table has only a longitudinal sliding movement; and even this movement of the table will be unnecessary where the work to be wrought does not exceed about two feet in extent. By the employment of this improvement the very cumbrous and expensive construction of framing and railways for the table and work to slide upon, which has heretofore been found necessary in carving machinery, may be partly, if not altogether, dispensed with; for, by the enlarged range of movement allowed to the cutting tool in the present machinery, devices and mouldings, of not very large extent, may be accurately cut, by fixing the work, under operation, upon any firm resting-place or bench within the reach of the swinging and sliding frame of the cutter.

In Plate XIII., fig. 1, represents a front elevation of the improved machinery, complete; fig. 2, is an end elevation of the same; and fig. 3, is a horizontal view, looking upon the machinery from above. *a, a,* is the bench, upon which the table *b, b,* carrying the material to be wrought, lies or runs longitudinally; in which latter case, the under side of the table has rollers *c, c,* running upon horizontal rails *d, d.* A vertical standard *e, e, e,* is affixed to the back of the bench, for the purpose of carrying the frames of the cutter and its appendages. The frames of the cutter consist of three distinct parts, viz., the part *f, f,* which slides vertically; the part *g, g,* which slides horizontally, in a transverse direction, across the table; and the part *h, h,* which swings horizontally, in a circular direction, upon pivots. The block of wood, stone, or other material, intended to be operated upon, having been fixed firmly upon the table or bench, as at A, A, the apparatus may be set to work by rotary motion being communicated to the drill or cutter *i,* by bands leading from a driving power, in the way shewn and generally understood. The treadle *l,* by means of well-known leverage, is employed for giving a vertical movement to the frame *f*; by which the cutter is raised from the work, or lowered into the work, as heretofore practised. In order to shift the cutter crosswise of the table, to suit any breadth of device, the winch or handle *k,* must be turned by the operator, when, by a rack and pinion *m,* at the back of the frame *g,* that frame will be slidden transversely over the table. The frame *g,* having been thus brought to its desired situation, the cutter *i,* may then be moved by the operator in a circular direction, and the frame *g,* slidden in or out, as the pattern may be more or less extended, in order to trace any required figure upon the work,—the frame *h,* turning horizontally upon its pivots *n, n.* Thus it will be perceived that, by the combined movements of the transverse sliding frame *g*, and the swinging frame *h*, under the direction of the operator, the cutter *i*, may be made to trace and cut any curved or straight grooves or mouldings in the block A, without shifting the position of the table whereon the block A, is fixed. But should the subject or device to be cut in the block be of such extent lengthwise as the cutter could not reach when the table is stationary, then the table may be slidden longitudinally upon its railway to the desired distance.

The patentee remarks, that he does not intend to claim, as of his invention, all the parts of the machinery shewn in the drawings;—the construction of cutter, and mode of driving it, the elevation and depression of the cutter-frame, and the longitudinal sliding movements of the table upon railways, having been included in a prior patent, granted to the present patentee; but that which he claims is, the attachment of the swinging cutter-arm to a frame capable of being slidden in a transverse horizontal direction, crosswise of the table, for the purpose of affording the means of bringing the cutter to operate upon a breadth of surface, to cut devices or patterns, without shifting the position of the work, or of the table on which it is fixed.—[*Inrolled in the Petty Bag Office, August,* 1847.]

To JOSEPH ORSI, *of Guildhall Chambers, in the city of London, Gent., for certain improvements in the manufacture of artificial stone, cements, ornamental tiles, bricks, and quarries,—being a communication.*—[Sealed 22nd March, 1848.]

THE patentee sets out his invention in the following manner:—

"Firstly, I employ for the manufacture of an artificial stone, suitable for building, paving, and other purposes, the following composition of materials,—to which I give the name of 'brown metallic lava:'—

Gravel or stone (broken into small pieces)	3 parts
Pounded chalk - - - - - -	2 "
Tar - - - - - - -	1 part
Wax - - - - - -	$\frac{1}{16}$ "

The tar is first melted in a cauldron, and the wax, gravel, or broken stone, chalk, and a mineral color, are successively added. The artificial stone or metallic lava, thus formed, is cast in moulds, either into solid blocks of any required form, or into hollow vessels, as troughs and tanks. It is also made into pipes in manner following:—A circular core or rod of wood, and of the length and diameter of the proposed pipe, is enveloped in paper or other suitable substance, to prevent the 'lava' adhering to the roller, and rolled over a flat table, covered with the lava in a warm and fluid state, till it has taken up a good coating of the lava; three or more iron ribs are then attached, lengthways, and at equal distances, to the half-formed pipe, by winding wire round them; and when this has been done, a second coating is added by rolling, as before, and of thickness sufficient to cover the iron ribs and wire. The pipe being now completed, is set aside to cool; after which the wooden core is withdrawn.

"Secondly, I employ for the manufacture of ornamental tiles, bricks, and quarries, another combination of materials, to which I give the name of 'ornamental metallic lava,' and which is composed as follows:—

Ground flint - - - - - -	2 parts
Marble (broken into small pieces) - -	3 "
Resin - - - - - - -	1 part
Wax - - - - - - - -	$\frac{1}{10}$ "
Some mineral substance, to give the required colors to the lava; as, for example, cobalt for blue, yellow ochre for sand-stone, red ochre for red granite, &c. - - - - - - -	$\frac{2}{10}$ parts

The modes of preparing this lava, and of casting it of various forms, are similar to those before directed to be followed in preparing and casting in the brown lava. When it is desired to produce an ornamental tile, brick, or quarry, according to any particular pattern or device, and in various colors, I proceed as follows:—Supposing, for example, the tile is to be made in four pieces, enclosed one within the other, each of a circular, polygonal, or any other arbitrary form, and colors respectively of (1,) blue (2,) yellow (3,) red and (4,) grey, I first cast the blue piece (1,) by itself in a suitable mould, and allow it to cool; I then take it from the mould, and place it in the centre of the mould from which the yellow piece (2,) is to be cast, and pour in the yellow lava (of which the latter is to be composed) round the blue piece; I then transfer the blue and yellow pieces (1, and 2,) which have been thus united together, to the centre of the mould from which the red piece (3) is to be cast, and pour the red lava (of which the latter is to be composed) round the blue and yellow; and, finally, I place the triple pieces of the yellow and red in the centre of the mould from which the outside piece of grey (4,) is to be cast, and complete the tile by the addition of the grey lava. I cast all these pieces on a flat iron, with their surfaces undermost, which are intended to form the top surface of the tile when in use; and, for the sake of economizing the materials of which they are composed, I make each casting from about half an inch to an inch only in thickness. I afterwards impart the requisite thickness and strength to the tile, by giving the whole a backing of the brown lava, first hereinbefore described, which is poured on in a warm fluid state. When the tile has set and become cold, it is ground and polished on its upper surface in the ordinary manner practised by marble workers; that is to say, by a flat stone, sand, and water.

"And, thirdly, I manufacture an excellent cement from either of the combinations of materials before described, observing only to reduce the materials to as comminuted a state as can be conveniently done, and to apply the cement in a warm state."

The patentee claims, Firstly,—the manufacture of artificial stone, termed "brown lava," of the peculiar combination of materials hereinbefore described. Secondly,—the mode of manufacturing the said brown lava into pipes, hereinbefore described. Thirdly,—the employment, in the manufacture of ornamental tiles, bricks, and quarries, of the peculiar combination of materials hereinbefore described, and designated "ornamental lava." Fourthly,—the mode of manufacturing the said ornamental lava into tiles, slates, and quarries, of various colors and patterns, as before described. And, Fifthly, —the manufacture of cements from the same combinations of materials as the brown lava and ornamental lava are respectively composed of, as before described.—[*Inrolled in the Inrolment Office, September,* 1848.]

To Edward Haigh, *of Wakefield, in the county of York, plumber, and manager of the Wakefield Water Works Company, for an invention for measuring water or any other fluid.*—[Sealed 9th May, 1848.]

This invention consists of a machine or apparatus, for measuring water or other liquids, composed of a wheel or revolving cylinder or drum, furnished with any convenient number of measuring-chambers, which are successively brought under an aperture or apertures, from which the water or other liquid to be measured flows from a chamber or chambers above.

In this machine or water-meter the measuring-drum or cylinder is divided into two parts, by means of a central disc or partition; each half of the drum having a separate feeding-pipe, to supply the water or other fluid to the measuring-chambers of that side of the drum. Any convenient number of measuring-chambers may be employed; but in the machine shewn in the drawings three chambers only are provided for each half of the drum, that is, six in all; and they are so arranged that while the left-hand side of the drum, for instance, is measuring the water that runs from its feed-pipe into one of its measuring-chambers, the liquid from the feed-pipe of the right-hand is running through the machine without being measured; and when the right-hand side of the drum is measuring, the liquid is passing from the left-hand feed-pipe through the machine without measuring. It will, therefore, be seen that the water from one or other of the feed-pipes is always being measured; while, at the same time, the water from the other feed-pipe is passing through the machine without being measured; but as the measuring-chambers, on each side of the drum, act alternately, and the feed-pipes and chambers are of precisely the same dimensions, no error can possibly arise on this account, and a decided advantage is obtained by this arrangement; as, owing to only one half of the liquid that passes through the machine being measured, the machine is rendered capable of registering a much greater quantity than if all of it were measured.

In Plate XIV., fig. 1, represents a longitudinal vertical section of the improved machine for measuring water or other liquids; and fig. 2, is a transverse vertical section of the same. *a, a, a,* represents the outer casing, which encloses the whole of the working parts; *b, b,* is the cylinder, drum, or measuring-wheel, which is divided into two halves by the central vertical partition *c, c*; and each half of the wheel or drum *b, b,* is sub-divided into three measuring-chambers 1, 2, 3, as shewn best in fig. 1. The measuring-wheel, drum, or cylinder *b, b,* is mounted on a horizontal shaft or spindle *d*, which turns in bearings made in or attached to the casing; and at one end carries a pinion that gears into a toothed wheel or second pinion, which communicates with the gearing of the registering or indicating apparatus. This apparatus, and the mode of transferring the motion of the measuring-wheel thereto, is not shewn in the drawing; but as it differs, in no essential degree, from the ordinary modes of registering quantities, as applied to gas and water-meters, and forms no part of the invention, it has not been thought necessary to give any detailed explanation thereof.

The water or liquid to be measured is conducted to the machine by the pipe *e,* which is forked or divided before it enters the machine, and is furnished with two cocks or apertures *f,* and *f*,* which conduct the liquid to a part of the machine or apparatus called the preparatory cistern. The liquid enters two separate chambers *g,* and *g*,* as seen best in the detached view, fig. 3, which represents a plan view of this part of the apparatus. By inspecting this figure and fig. 1, it will be seen that the small preparatory cistern, at the top of the machine, is divided by a partition *j, j,* into two parts, which are again sub-divided by a cross partition *i, i,* so as to form four chambers *g, g*, h,* and *h*.* The water or other liquid from the forked supply-pipe *e,* is allowed to run freely into the chambers *g,* and *g*,* from whence it passes over the partition *j, j,* (a portion of the top part of which is cut away for that purpose) into the other chambers *h*, and *h**, and from thence through the holes *k*, *k*, in the bottom of the chambers, into the interior of the machine. As the rush of water over the partition *j*, *j*, might possibly interfere with a correct measurement of the water, if the necessary precautions were not taken, two vertical semi-circular shields *l*, *l*, are placed, respectively, in the chambers *h*, and *h**; whereby the even and regular flow of water down the pipes *k*, *k*, will be prevented from being interfered with by the rush of liquid over the partition *j*, *j*.

The periphery of the vertical partition *c*, of the measuring-wheel or drum *b*, *b*, is furnished with six projecting pins or teeth *m*, *m*, (see fig. 1,);—the number of pins *m*, *m*, being equal to that of the measuring-chambers, opposite to the entrance of each of which one of the pins or teeth is placed. The object of these pins or teeth is to support or steady the revolving wheel or drum *b*, *b*, while the water or liquid is running into one of the measuring-chambers from one of the pipes *k*, *k*. This is effected by the pin *m*, of the chamber that is being filled, resting upon a roller at the end of a tumbling lever *n*, which is mounted in bearings attached to the inside of the casing, and is furnished, at its opposite end, with a counter-balance weight *o*. The weight *o*, is made adjustable by that end of the lever which carries it being threaded, so that by merely screwing the weight higher up or lower down, as may be required, the counter-balance may be regulated with the greatest nicety, for supporting the measuring-chamber until it is filled with liquid, when it will yield, as shewn by dots in the figure, and allow the full chamber to descend and empty itself. This little apparatus the patentee denominates the " regulator " or " governor," as it is upon the accuracy and precision of its movements that the correctness of the machine in a great measure depends. In order that the revolving wheel or drum *b*, *b*, may be prevented from turning in the wrong direction, the periphery of the central partition *c*, *c*, is made with ratchet teeth, and a pall or click *p*, attached to any convenient part of the casing, takes into these teeth, as shewn. The water or liquid, when delivered to the bottom of the meter, is allowed to run out through the pipe *q*; but if, by accident or design, the pipe *q*, should become stopped up it will flow out of the opening *r*, and will give notice that something is wrong and requires attention.

The patentee claims the construction of a machine or apparatus for measuring water or liquids, consisting, firstly, of a preparatory cistern, into which the liquid to be measured first enters; and, secondly, of a revolving drum or wheel, divided into two parts, and containing a series of measuring-chambers, which are filled in succession from supply-pipes, communicating with the preparatory cistern. He also claims the use and application of the tumbling-lever or regulator *n*, for supporting the measuring-chambers while they are being filled.—[*Inrolled in the Petty Bag Office, November,* 1848.]

To Richard Clarke Burleigh, *of Featherstone Buildings, in the County of Middlesex, Gent., for improvements in burners for obtaining or producing light and heat, and in apparatus to be used therewith.*—[Sealed 8th February, 1848.]

This invention of improvements in burners for obtaining or producing light and heat, and in apparatus to be used therewith, may be divided into two general heads; the first of which relates particularly to the construction of burners for producing light and heat by the combustion of gas, oil, or spirit; and the second to various apparatus to be applied to or used in connection with burners, for the purpose of guiding the currents or drafts of air to the flame to support combustion, and also for measuring and regulating the transmission of gas from the supply-pipe to the burner, so as to cause it to pass thereto in a uniform and continuous flow.

The first head of the invention relates, in the first place, to various improvements in burners, for economically consuming gas, whereby a disc-shaped flame may be obtained, which will more perfectly illuminate objects placed beneath such burners than the ordinary kinds of flame; and will also give an intense heat when required. Under this head of the invention there are secondly included other improvements in gas-burners, whereby the capacity or powers of burners may be regulated, so as to consume the gas by altering the shape or the height of the flame: this is effected by shutting off the gas from the ordinary jets, and causing it to pass through a jet or jets of smaller capacity; and, thirdly, the improvements, under this head, refer to the construction of Argand burners for consuming oils and spirits for illumination, by the use of which, in conjunction with part of the improvements specified under the second head of the invention, the matters used for producing light may be economized, and a steady flame, not liable to be prejudicially affected by chance currents, is produced.

The second head of the invention relates, firstly, to improvements in the means of guiding the upward current of air to the flame; secondly, to improved arrangements of apparatus for regulating the flow of gas to the burner,—by means of which the inconvenience and danger of an over-supply or unequal pressure of the gas is prevented; thirdly, to improvements in apparatus for measuring the gas as it comes from the main, and in regulating its issue from the meter, in such a manner that it may be transmitted in a uniform and continuous flow to the burners to be consumed.

The first improvement, under the first head of the invention, consists in making the holes of the burner horizontal, or nearly so, in place of vertical, as is usual, and in employing therewith a cone or cylinder for guiding the currents of air up the outside of the burner, and also a disc of metal for the purpose of deflecting the air that passes up the inner or central part of the burner, and causing it to pass, in a horizontal direction, over the stream of gas that issues from the horizontal holes of the burner. These parts are employed in conjunction with a globe or shade, with curved sides; and by this construction, combination, and arrangement of parts, the patentee states, that he is enabled to dispense with the chimney, hitherto requisite for the proper combustion of gases on the Argand principle, and to produce (in the centre of a flattened globe) a horizontal disc of flame, which is not so liable to smoke, when exposed to irregular drafts of air, as flames of the ordinary shape. Further advantages, which are said to result from this arrangement, are, a high degree of purity in the light, a moderate consumption of the material employed to produce the light, and the absence of shadow beneath the burner.

In Plate XV., fig. 1, represents the disc-flame gas-burner; part of the burner and some of its appendages being shewn in section, in order the better to explain its internal construction. It is composed of a ring *a*, similar to ordinary Argand burners, except that in place of making the jet-holes vertical, and on the upper end or top of the burner, they are made horizontal, or at right angles to the stem of the burner, and are drilled through the side of the ring, which is supplied with gas by the small branch pipes *b*, *b*, *b*. A metal or other cone or cylinder *c*, is made to surround the burner, and guide the outer current of air to the flame, while the inner current passes up the centre of the burner, strikes against a disc *d*, and issues from under the disc in a horizontal direction; thereby flattening out the flame in the manner shewn in the drawing.

It will be readily understood, upon examining the drawing, that the course of the combustible gas, and also of the currents of air up the centre of the burner to support combustion, are never opposed to each other, as is the case when the jet-holes of the burner are vertical and a deflector is used; but while the gas is issuing from the burner, in a horizontal direction, the air up the inside of the burner is also deflected in a horizontal direction by the disc *d*, and passes, in full force, over the stratum of gas that issues from the horizontal holes of the burner. Over the burner a globe or shade of glass is placed; and as a current of air will pass up between the cone or cylinder *c*, and the outside of the burner, it will turn over the upper edge of the cone and sweep round the sides of the glass globe, and will counteract any tendency that the disc *d*, may have to too much depress the flame, which will consequently be made to assume a horizontal or nearly horizontal position.

Fig. 2, represents an elevation of another burner, which is merely a modification of that just described; the only difference being, that in place of supplying the burner by short branch pipes *b, b,* the burner consists of a cylindrical box or case, as usual. When flames of fanciful forms are required, the patentee employs deflecting discs and cones of various shapes, such as those shewn at figs. 3; the cones being fluted, and vandyked at their upper edges, so as to cause the outer stratum of air to pass over the flame in an irregular manner; and the peripheries of the discs being made in various forms, according to the form of flame required.

The second improvement under this head is shewn at figs. 4, and 5; fig. 4, represents, in vertical section, a gas-burner, which is made adjustable upon a central jet, so as to allow, at certain times, of merely a small flame remaining ignited, which will light up the Argand burner, which surrounds it, when required. The burner *a,* is screwed on to a vertical tube *h,* the upper end of which is brought to a fine edge, so that it may be screwed against the inside of the burner, immediately below the small jet-hole *i.* When gas is supplied to the burner, it rises up the tube *h,* issues from the upper end thereof, and passes along the lateral passages *j, j, j,* into the interior of the burner, from whence it issues through the ordinary jet-holes at top. When it is required to reduce the flame, so as only to have sufficient to keep the burner alight, it is only necessary to screw down the burner, by one or two turns of the thumb-screw *k,* and the sharp edge of the tube *h,* will abut against the inside of the burner, and prevent any gas from issuing except through the small jet *i,* which will always remain ignited so long as gas is supplied to it; and when more light is required, it can be readily obtained by merely unscrewing the burner by means of the thumb-screw *k,* and allowing the gas to obtain access to the jets of the Argand burner, which will be immediately ignited by the flame of the central jet *i.*

Fig. 5, represents, in vertical section, a fish-tail burner, with the above improvement adapted thereto; and as similar letters of reference are used to denote corresponding parts in this figure, and in fig. 4, it will not be necessary to repeat the description. The patentee remarks, that, by means of the above mode of constructing gas-burners, he is enabled to dispense with the use of the ordinary stop-cock, as, if the small central jet *i*, is not made, the gas may be as effectually shut off from the burner, by merely turning the thumb-screw *k*, as when a stop-cock is used. He further states, that it will be found desirable to construct the thumb-screw *k*, of wood, ivory, or some other bad conductor of heat.

The third improvement under this head of the invention (viz., improvements in Argand burners for consuming oils and spirits for illumination) is shewn at figs. 6, 7, 8, and 9. Fig. 6, represents, in vertical section, a lamp, constructed according to these improvements, and adapted for burning camphine spirit, naphtha, or other similar combustible matters. The patentee takes a burner, constructed in the usual manner for an oil or spirit lamp, such as that shewn at fig. 6, and shortens, by about half an inch, the inner tube *e*, that admits air to the interior of the flame; then, when the Argand wick is secured in its proper position by any of the ordinary plans, a small loose tube *f*, is inserted in the inner tube, in such a manner that the upper edge of the short tube *f*, which is turned over and made trumpet-mouthed for the purpose, may rest upon the upper edge of the wick, so as to slightly curve it outwards, as shewn in the drawing. By this means, when the wick is ignited, it will only burn at its outer edge and surface, the loose short tube *f*, being in contact with its inner surface: the tube is adapted in such a manner that it will rise and fall with the wick, as the latter is raised or depressed by the ordinary rack and pinion movement.

A modification of this improvement may be made by attaching the tube *f*, to the inner tube *e*, by means of a small stud or pin working in a slot or hole, similar to a bayonet-joint. When this plan is adopted, two or three turns of the cross threads of the wick should be pulled out before placing the tube *f*, in its place; then, upon raising the wick in the ordinary manner, the upper edges of the wick will be brought against the curved or trumpet-shaped mouth of the tube *f*, and be thereby directed outwards. In addition to the small tube *f*, a disc or deflector *d*, and a metal or other cone *c*, are used; and by the combined employment of these parts, a dish or tulip-shaped flame of great purity, and not so liable to smoke, is produced. A small ring of cotton, felt, or other suitable material, is sometimes placed on the top of the wick, before applying the tube *f*; as, by this means, the trouble and difficulty of trimming the wick is avoided,—it being only necessary to remove the ring that has been used and replace it by a new one, when it becomes too much charred for use. These burners must be surrounded or enclosed by a glass globe, moon, or shade, of some kind; but the ordinary chimney may be dispensed with. It has been found advisable, however, for spirit lamps, to adapt to the upper aperture of the glass globe or moon a short conical glass tube or chimney, and to connect it to the globe or moon below by means of a gallery, made of metal, wood, or other suitable material. This chimney should be about five inches in height and two inches in diameter, if the globe or moon is about six or eight inches in diameter; and the several parts may, if thought desirable, be connected together by gypsum or other suitable cement, as it is more convenient to connect the parts together in this manner than to make them in one piece. A bulb-shaped or even straight chimney may be employed with this lamp, when the flame, instead of being dish or tulip-shaped, as is the case when flattened globe-shades are used, will be nearly straight and vertical, according to the particular form of the globe, shade, or chimney employed. A spherical glass or shade, which will give a tulip-shaped flame, is however preferred.

The horizontal gas-burner, described under the first head of the improvements, is (when certain modifications are made therein) applicable for heating purposes, as well as for illumination. When these burners are employed for producing heat, and to be used as stoves, the globe or shade should be made of metal, delf-ware, porcelain, or some other material, capable of resisting the heat, which will be given off from the burner. As a brilliant light is not required, the cone is not used, and the metal or porcelain globe or shade is brought nearer to the flame; the effect of which will be, that very great heat, without much light, will be given off. At fig. 10, a mode of adapting the improved gas-burner for heating purposes is shewn;—the figure represents a vertical section taken through about the middle of the apparatus. *a*, is the burner, constructed in a similar manner to that shewn at fig. 1, but of much larger size; the burner is inserted in a hole, made in the centre of a metal plate *l, l*, which is supported on a perforated or open work-stand *m, m*, for the purpose of admitting air to the flame. This plate is furnished with a cylindrical gallery *n, n*, for the purpose of supporting the inner shade *o, o, o*, which is made to nearly fit the burner, leaving not more than a quarter of an inch space all round; a hole or aperture *p*, being made at top for the exit of the heated air and vapours. A second shade or cover *q, q, q*, is placed over the shade *o*, and is supported upon an open-work metal gallery *r, r*, fixed to the plate *l*; and the whole is covered with an external shade or cover *s, s, s*, which rests on the plate *l*, and is furnished with a hole or aperture at top, for the purpose of carrying off the gaseous products of combustion. The action of this apparatus is as follows:—The burner being lighted, and the several shades or covers placed in their respective places, air to support combustion will pass up the interior of the burner, and be, by means of the deflecting disc, directed horizontally over the stream of gas issuing from the horizontal holes of the burner; and, at the same time, another current of air will pass up between the inner shade *o*, and the outside of the burner to the under side of the flame, the heat from which will be made to rush round the inner globe and out at the aperture at top, then return down the space between the shades *o*, and *q*, pass under the lower edges of the latter, through the apertures in the open gallery, which supports the same, and, after rising up between the shade *q*, and the outer cover or shade *s, s*, ultimately escape from the opening at top. By this arrangement, the outer cover will be rendered extremely hot, and made to radiate its heat to the surrounding atmosphere.

In place of causing the heated air and gases to circulate between the shades or covers, in the manner just explained, they may be conducted directly from the inner shade, by means of a chimney (adapted to the opening *p*, above) to a heating apparatus or closet, composed of a series of tubes or cells, through which the heated air is to pass, in order to warm air that circulates in the closet or apparatus outside the tubes; or the heated vapours may be made to heat water or air contained in the tubes; which water or air, when conducted to other situations, may be employed for warming the atmosphere of rooms or places, by means of radiation from pipes, or by any of the well-known plans for heating or warming by hot water or hot air.

When the apparatus is to be employed for heating water, or for domestic purposes, in place of the inner shade a hollow spherical vessel is provided, with double sides, so as to form a chamber which may contain water or other liquid;—the burner in the middle will, by the great heat given out therefrom, quickly heat the water.

The first improvement under the second head of the invention relates to a means of guiding the upward current of air to the burner, and is shewn at figs. 6, 7, 8, and 9. At fig. 6, an improved mode of constructing the pillars or stems of lamps, so as to admit air through them to the burner, is shewn; fig. 7, is a horizontal section of the pillar or stem, which, it will be seen, is subdivided longitudinally by means of slips of thin metal, or other convenient material;—the air to supply the interior of the burner being admitted into the sections of the tube by the lateral openings *g*, *g*, at or near the bottom of the pillar. By this means an opening is directly presented to any casual side draft, which, in place of passing directly across the ascending current, as is the case in the ordinary construction of lamps, thereby interrupting the same, and causing the flame to collapse and smoke, is made to ascend with the ordinary current, and pass out under the disc *d*, without injuriously affecting the flame.

Fig. 8, represents, in vertical section, and fig. 9, in plan view, an improved mode of supplying air to the external part of the burner, and under side of the flame. This plan is a modification of that just described; it consists merely in adapting or applying the radiating strips of metal or divisions *i*, *i*, *i*, to the under side of the cone, or outside of the burner, whichever may be found most convenient in practice. The divisions are, in this instance, affixed to a gallery placed under the cone, which is thereby supported in its place on the burner. This arrangement is equally applicable to both the gas and spirit or oil lamp burners, whether constructed according to this invention or in the ordinary manner; in fig. 8, however, it is shewn as applied to one of the improved horizontal spirit lamps. *a, a,* is the burner; *c,* the cone; *d,* the deflecting disc; and *i, i,* the radial divisions,—any convenient number of which may be employed.

The second improvement under the second head of the invention relates to improved arrangements of apparatus for regulating the flow of gas to the burners. It is well known, that the pressure at which gas passes from the gasometer through the main to the burner very frequently varies, according to the number of burners in communication with the main, or from the irregularity of pressure at the gas-works, or other causes; and that this irregularity of pressure gives rise to certain inconveniences, particularly that of causing the flame from the burner to smoke when the pressure becomes unduly augmented in some of the burners by the extinction of others on the same main. The object of this part of the invention is to prevent any inconvenience arising from a sudden increase of pressure from any cause, and to regulate the supply of gas to the burner in such a manner that when the pressure increases to an extent that would cause the burner to smoke, the quantity of gas supplied thereto will be lessened instantaneously by means of a self-acting regulator, which may be attached to the burner, or, if preferred, to the apparatus for measuring the quantity of gas consumed.

The most simple construction of the improved gas regulator consists of a small chamber, through which the gas is made to pass on its way to the burner; and which chamber is furnished with a light disc-valve, resting upon the upper edge of a short tube, which is pierced with a series of horizontal holes at its upper end. Fig. 10, represents a vertical section of one of the improved gas regulators. *t,* is a short tube, provided with a female screw, which is intended to fit into the upper part of a gas-pillar. This short tube is furnished with a number of holes near its upper end; and it carries a small chamber u, called the regulating-chamber, which is closed at top by a cover v, which is furnished with a short threaded pipe to receive the stem of the burner. The gas-valve or regulator consists of a thin disc of metal w, pierced with a central hole, and being somewhat smaller in diameter than the chamber u, an annular space is left between the chamber and the disc. This valve, when not required to act, is supported on the upper edge of the short tube t; and as the gas is supplied to the apparatus from the lower end of the tube t, it ascends and, issuing out at the horizontal holes in the upper end of that tube, passes over the edge of the disc or valve w, and up the pipe of the cover v, to the burner; but if there is any undue pressure of gas in the pipe or tube t, the disc or valve w, will be lifted by the upward current from its seat and be kept in contact with the lower end of the tube of the cover v, and will thereby prevent any gas from getting to the burner except through the small hole or aperture in the centre of the disc or valve w: the burner will thus be prevented from smoking. Immediately, however, that the pressure is reduced, the valve w, will fall and assume its original position.

Fig. 11, represents, in side view, and fig. 12, in vertical section, another mode of constructing the improved gas-regulator,—the principle of action being, however, the same in both cases. In place of the short pipe t, (shewn at fig. 10,) a cylindrical box $t*$, $t*$, is screwed to the chamber u, and forms the bottom thereof. The upper part of the box $t*$, is perforated, horizontally, all round, and its upper edge forms a seat for the valve w, as in the former instance. In this case, however, instead of making a hole in the centre of the valve w, four fine holes are made in a tubular part of the cover v, which projects into the chamber u. The box $t*$, is made to screw into the chamber u, in order that it may be rendered adjustable; and when the two parts $t*$, and u, are properly adjusted, they are secured by means of the clamping-screw x.

When it is required to adapt this regulator to the burners of chandeliers, it will be found convenient to adapt one single regulator, of suitable capacity, to the pipe which supplies all the burners of the chandelier; it may be adapted to the supply-pipe, by means of a sliding or telescope-joint, in such a manner as to admit of the pipe being lengthened or shortened, as may be required, for the purpose of adjustment. The arrangement of parts for this purpose is shewn, in side elevation, at fig. 13; and as (with the exception of the sliding-tube) there is no essential difference between this plan and that just described, further explanation will be unnecessary.

The third improvement under this head of the invention relates to improvements in apparatus for measuring gas and regulating its flow from the meter to the burners. By these improvements, which are applicable to wet as well as dry meters, the construction of gas-meters is said to be simplified and their action rendered more correct; and further by the peculiar construction and arrangement of parts, hereafter described, the flow of the gas, in its passage through the meter to the burner, is not so liable to be affected as in meters of the ordinary construction. In the improved gas-meters there are only two measuring-chambers, that being the simplest form in which a meter can be constructed; but in all gas-meters, hitherto made with but two measuring-chambers, it has been found extremely difficult, if not impossible, to prevent the working of the internal parts of the meter from injuriously affecting the lights,—causing them to burn unsteadily at every change in the motion or oscillation of the measuring-chambers or valves. Now the principal object of this part of the invention is to obviate these inconveniences. Fig. 14, is a longitudinal vertical section of the improved dry gas-meter, taken through the measuring and regulating chambers and valve-boxes; fig. 15, is a transverse vertical section, taken through the measuring-chambers, diaphragm, and valve-box for admitting gas to the meter; and fig. 16, is a sectional plan of the measuring-chamber. The meter is hexagonal in shape, and consists of a casing or vessel *a, a,* made of any suitable material, and divided internally by means of a flexible diaphragm or partition *b, b,* into two chambers, denominated the measuring-chambers. The diaphragm *b,* is furnished with a flat metal or other plate *b*,* to which it is secured in any convenient manner. This plate is, at its lower end, connected to a horizontal shaft or spindle *c,* which passes through holes made in the side of the casing, and is furnished with stuffing-boxes, to prevent the escape of gas. The shaft or spindle *c*, carries, at each end, a short arm or lever *d, d*; in the lower ends of which a second horizontal shaft or rod *e*, is mounted. This rod *e*, carries, at or near its centre, a weighted balance-lever *f*, which extends downwards as near as practicable in a line with the metal plate *b**, of the diaphragm. The object of this weighted lever is to counterbalance the diaphragm *b*, and also to work the valves for the admission and exit of the gas. The meter is furnished with two valve-boxes *g*, and *g**, one for the admission of the gas into the meter, and the other for its exit. The valves in both boxes being nearly similar in construction, and worked by the same means, the same description will therefore suffice for both boxes,—similar letters of reference being marked on corresponding parts; it should however be remarked, that the two exit tubes from the valve-box *g**, cross each other.

Fig. 17, represents a sectional plan of one of the valves in its box *g*, and the regulating-chamber connected therewith. The valves *h*, h^1, are clack-valves, and are mounted upon a horizontal rod or spindle *i*, which extends through the sides of the box, and carries a collar *j*. This collar *j*, is secured to it by a screw or otherwise, and is furnished with a pin or stud, for the purpose of forming a sort of clutch-connection with another collar *k*, on the short hollow shaft *l*, which, at its opposite end, carries two vibrating weighted arms *m, m*. The valves in each of the boxes *g*, and *g**, are provided with the above parts for working them; and the vibrating weighted arms or levers *m, m*, of both sets of valves, are connected together by straps or connecting-pieces. Now the weighted balance-lever *f*, connected to the diaphragm *b*, extends down between the vibrating arms of both sets of valves, and about midway between them, as seen in the several figures; and it will be understood that, as the diaphragm *b*, moves backwards and forwards in the casing *a, a*, it will cause the balance-lever *f*, to vibrate also, and act upon the arms *m, m*, of the valves. As, however, it is necessary that the valves should only act momentarily, part of the periphery of the collar *k*, is cut away, in order that one of the vibrating arms *m, m*, may be gradually raised to the vertical position, without affecting the valve; but immediately that the arm *m*, passes the centre of gravity, it suddenly falls over to the opposite side, and trips the valve with it. Gas is admitted to the meter through the pipe *n*, and enters the box or chamber *g*, which, by means of the valves *h*, h^1, communicates with a second chamber *p*, below. This chamber is divided into two compartments by means of a central partition *q*; and each compartment is furnished with a clack-valve *r*, r^1, and a vertical pipe or tube *s*, s^1, whereby gas is supplied to both the measuring-chambers of the meter alternately. In fig. 15, the left-hand measuring-chamber is represented as nearly full of gas, which is escaping therefrom,—the valves having just been tripped by the balance-lever *f*; and the right-hand chamber is just beginning to fill,—the valves for that purpose being open. Upon the gas issuing from either of the measuring-chambers, it passes down one of the pipes *t*, or t^1, according to which chamber is emptying itself, and enters one of the compartments of the chamber *u*, u^1, from which it passes into the valve-chamber *g**, and from thence through one of the valves into a lower chamber *o*, which communicates with a flexible regulating-chamber *v*, *v*. If, when the gas enters this chamber, it should be of a suitable pressure to pass directly to the burner, it will only keep the regulating-chamber expanded to about the extent shewn in the drawing, and will issue from the chamber by the pipe *w*, in a regular and continuous flow; but if the pressure of the gas should be too great, or greater than is desirable, it will expand the regulating-chamber to a greater extent, by raising up the side *z*, thereof; and, by means of a rod or lever *x*, the exit-valve will be nearly closed, and the supply of gas be thereby limited to the actual requirements of the burners. The patentee remarks, that this part of the apparatus should be so arranged or constructed, either by making a small aperture in the valve or otherwise, as that the exit-pipe should never be entirely closed, otherwise the supply of gas will be cut off, and the lights will be extinguished. In order to make the expansible regulating-chamber *v*, work as freely and as easily as possible, it may be advisable to counterbalance the weight of the moveable top *z*, of the chamber by means of a weighted lever *y*, which may be mounted on the end of the spindle to which the moveable top *z*, of the chamber is connected. The registering part of the apparatus is worked by a small lever or arm on the shaft or spindle *c*; and this small lever may be made to actuate a ratchet-wheel on the unit dial or plate.

At figs. 18, 19, and 20, the improved wet meter is shewn, wherein but a small quantity of water, mercury, or other liquid is necessary to make the joints of some of the parts gas-tight. Fig. 18, is a longitudinal vertical section, taken through the measuring-chambers and valve apparatus for admitting gas to the interior of the meter; fig. 19, is a transverse vertical section, through the vibrating vessel or drum (which forms the measuring-chambers), and the valve apparatus for regulating the inlet and outlet of gas to and from the meter; and fig. 20, represents the regulating-chamber in longitudinal vertical section. The meter consists of an outer casing *a, a, a,* and an inner casing, vessel, or drum *b, b,* which is made to vibrate on a rocking-shaft or spindle *c,* and is divided into two compartments by means of a central partition *b**. The rocking-shaft or spindle *c,* of the measuring-drum or vessel *b,* is connected at one end to the index or registering apparatus in the dial-box A, precisely as in the former instance, and is furnished at each end with two arms or levers *d, d,* which carry a second shaft *e,* to which a vibrating arm *f,* is attached, for the purpose of working the valves. This arm may be weighted, if thought desirable, so as to counterbalance the weight of the drum or vessel *b, b.* Stationary filling-pieces or boxes *g, g,* made either of wood or thin metal, and which may be filled with saw-dust, cork-cuttings, or other light material, are fixed in the measuring-chambers of the drum *b, b,* and have holes made or bored therein, for the purpose of allowing the gas to pass through them to and from the measuring-chambers. Each of these filling-pieces has two holes *s,* and *t,* made therein, one for conducting the gas to the measuring-chamber and the other to allow it to escape therefrom. The lower part of the meter is supplied with water or other liquid, so as to form an hydraulic joint, and prevent the gas from one of the measuring compartments obtaining access to the other. The liquid need only just cover the spindle or shaft *c*; and as the filling-pieces *g*, and g^1, occupy a considerable portion of the space that would be otherwise occupied by the liquid, a comparatively small quantity of the latter will be required to form a gas-tight joint. The action of the meter is as follows:—Gas is admitted from the main through the supply-pipe *n*, to the upper chamber of the supply-valves *h*, h^1; from whence it passes through one of the valves into one or other of the compartments of the chamber below, according to which of the valves is open; from thence it passes through the valve in this lower chamber and up the long hole *s*, in the filling-piece, into one of the measuring-chambers of the drum or vessel *b*, as shewn by the arrows in fig. 18; and as gas is entering and filling this chamber, while it is at the same time passing out of the other chamber down the hole *t*, of the filling-piece, the pressure on the left-hand side of the partition *b**, will gradually move the drum *b*, over towards the right, until the arm *f*, of the spindle *e*, causes the valves to trip over and reverse the action.

The entrance and exit-valves are constructed and worked in precisely the same manner in this meter as in the one before described, except that the valve-spindle carries a double-armed lever *m**, against which the lower end of the arm *f*, is made to act instead of against the connecting-pieces of the levers *m*, *m*, as in the former instance. The gas, after having passed through the meter, escapes through a pipe leading from the lower chamber of the exit valve-box into the regulating-chamber *v*, the construction of which is more distinctly shewn in the sectional view, fig. 20. This regulating-chamber is semicircular in shape, and consists of an outer casing *a**, *a**, inside which a second chamber 3, 3, is fixed, in such a manner as to leave a little space between the sides of the two parts *a**, and 3, so as to admit of a moveable cover *z*, being placed between them, in the manner shewn in the figure. This moveable cover or lid may be counterbalanced by a weighted lever or arm, if thought desirable; it is connected by means of a rod *x*, with the exit-valve *x**, so that as the cover *z*, rises, which it will do whenever there is any pressure of gas in the regulating-chamber, it will, at the same time, partially close the exit-valve *x**, and prevent too great a stream of gas from passing to the burners. An adjusting screw is screwed into the casing, and projects through the same, and prevents the exit-valve from entirely closing the pipe.

The patentee claims, Firstly,—as regards gas-burners for the production of light and heat, the combination or arrangement above described and shewn in the drawings, or any mere modification thereof, whereby a horizontal or dish-shaped flame of great illuminating and heating power may be produced without the liability of the same smoking; he also claims the constructing of gas-burners with adjustable jets, whereby the direction of the gas may be altered, the quantity consumed reduced, or the light altogether extinguished, without the use of stop-cocks. Secondly,—in reference to lamps or burners for consuming oil or spirit, he claims the use of the short tube *f*, whether loose or attached to the inner tube, for the purpose of causing the flame of the lamp to burn from the outer edge or side of the wick, and, in conjunction with a cone, deflecting disc, and shade or chimney, to produce either a dish or tulip-shaped or nearly vertical flame, according to the form of globe, shade, or chimney employed. Thirdly,—the use of cones and discs of varied forms, as shewn, for the purpose of producing flames of fanciful shapes. Fourthly,—subdividing the passage, through which air is supplied to the interior or exterior of the burner, by means of slips of metal or other suitable material, so as to prevent accidental drafts or currents passing across or interfering with the ascending current of air to the burner. Fifthly,—the construction of regulators for regulating the pressure of gas in its passage to the burner, by means of a metallic or other disc, which is acted upon by the gas, and made to partially close the passage when any undue pressure of gas takes place. Sixthly,—in reference to dry meters for measuring gas, he claims balancing the moving parts, such as the diaphragm and its appendages, by means of weights, as shewn; also the several modes of constructing and working the valves, as well as the adaptation of a regulating-chamber, whereby the bobbing, jumping, or unpleasant effect produced on the light by the change of the valves, and by the motions of the measuring-chamber, is avoided. Seventhly,—as regards wet meters, he claims the use of the oscillating vessel *b, b,* to which are adapted filling-pieces, whereby a great quantity of the water or liquid, usually employed, is dispensed with, and the level of the liquid does not determine the correctness of measurement. And, Lastly,—the use of the gas-meter regulator, or any mere modification thereof.—[*Inrolled in the Petty Bag Office, August,* 1848.]

To JOHN HENDERSON PORTER, *of Blackheath, in the county of Kent, engineer, for improvements in iron girders, beams, trusses, and supports, and in rendering the floors of buildings fire-proof by the use of iron.*—[Sealed 8th March, 1848.]

THIS invention consists, firstly, in the application of corrugated iron to the construction of girders, beams, trusses, or supports generally (whether the corrugations be in curved lines or in angular lines, forming parts of cylinders or tubes, and resisting compression in the direction of their length); and, secondly, in a particular application of the corrugated iron (in which the corrugations of the plates are caused to assume both vertical and horizontal positions) to render the floors of buildings fire-proof.

In Plate XIII., fig. 1., is a side elevation of a beam, constructed according to this invention; and fig. 2, is a transverse vertical section of the same. *a,* is a plate of corrugated iron, on the top and bottom edges of which the caps or frames *b,* of wrought angle-iron, are placed, and the wrought-iron bands *c,* are shrunk upon them; and, then, to complete the beam, rivets may be passed through the frames *b,* and bands *c,* where it may be thought desirable. The patentee remarks that such a beam becomes a beam, girder, truss, or support, according as it is used for one purpose or the other in the construction of a building. Sometimes, instead of using the angle-iron caps or frames *b,* the patentee forms a beam by combining bars of wrought T-iron, shewn at *d*, in the section fig. 3, with two corrugated plates *a*.

Fig. 4, is a side elevation of a girder, constructed according to the plan above described, with the addition of a third plate of corrugated iron placed with its corrugations in a horizontal position, between the other two plates (which have their corrugations in a vertical position), and riveted or bolted to them.

Fig. 5, exhibits an enlarged view of the girder, partly in plan view and partly in horizontal section; and fig. 6, is a transverse vertical section of the same, also upon an enlarged scale, in order to exhibit the parts more clearly—in these figures *e*, is the third plate, which is fixed, with its corrugations in a horizontal position, between the two plates *a*, *a*. The girder is shewn supported by two pillars *f*, *f*, constructed of corrugated iron, according to this invention, in the manner represented by fig. 7, which is a horizontal section of one of the pillars upon an enlarged scale. The bodies of lighthouses and windmills, and chimney-shafts, may be constructed in this manner. An arched girder may be also formed of corrugated plates, combined with bars of T-iron; the corrugations of all the plates used in constructing this girder may be made to radiate from the centre of the circle of which the under-side of the girder is an arc; or the corrugations of the plates on one side of the girder may be placed in the reverse direction to those on the other side; and the bands may be drawn tight by nuts and screws, instead of being shrunk on.

The method of constructing fire-proof floors for buildings is represented at fig. 8, which is a transverse vertical section of two beams, such as above described, supporting a floor upon and between them. *g*, is an arch of corrugated iron, sustaining, by means of the bearers *h*, the horizontal plates *i*, of corrugated or plain iron, which lie upon the beams *m*; and on these plates cement, asphalte, concrete, or such like material may be laid, to form the even surface of the floor. The thrust of the arch may be counteracted, in large buildings, by wrought-iron tie-rods, of any convenient form, as shewn at *j*; which rods pass through the arch *g*, and are keyed up on each side of the beams with the tie-bars of the adjoining arches. To prevent fire from spreading, the patentee also fixes horizontal plates of corrugated or plain iron between the beams, at the lower part of the same, as indicated by the dotted lines *k*,—such plates may be strengthened by placing a bar of angle-iron across the corrugations, and riveting it thereto; and they may be supported by rods from the arch *g*, as shewn at *l*.

The patentee also shews the application of a curved rib or beam, (constructed in the same manner as the one represented at figs. 5, and 6,) for sustaining a level floor or (in the event of its being applied to a bridge) a level road, by means of corrugated plates, placed in the spandrils of the arches.

The patentee claims, Firstly,—the application of corrugated iron (the corrugations resisting compression in the direction of their length) to the improving of the construction of iron girders, beams, trusses, and supports generally, as above described. Secondly,—the improved application of corrugated iron, in the manner above set forth, in order to render the floors of buildings fire-proof.—*Inrolled in the Inrolment Office, September*, 1848.]

To Isaac Hartes, *of Rosedale Abbey, in the county of York, farmer, for certain improvements in machines or machinery for rowing, sowing, and manuring land.*—[Sealed 2nd May, 1848.]

This invention consists in certain improvements in machines for depositing seed and manure; by means of which, the seed and manure may be deposited in successive portions, instead of in a continuous stream; and also in apparatus for forming regular rows or furrows in the land.

In Plate XV., fig. 1, is a vertical section of a machine, constructed according to this invention, for depositing seed and manure. It consists of a body, mounted on two wheels, and furnished with a pair of shafts, in order that it may be drawn along by a horse. The body is divided into two compartments *a*, and *b*; the larger *a*, being intended to contain manure, and the smaller *b*, to contain seed. On the axle of the running-wheels is fixed a toothed wheel *c*, (indicated by dotted lines), which gears into another toothed wheel on the end of the roller *d*; the surface of this roller is studded with a set of projecting-blades *e*, which are made sufficiently long to project a short distance through openings in the bottom of the manure-compartment *a*; so that when the roller is caused to rotate, by the machine being drawn onward, the blades *e*, will deposit the manure in successive portions on the land. Motion is also transmitted from the wheel *c*, through the toothed wheel *f*, to another toothed wheel fixed on the roller *g*; around this roller an endless band *h*, passes, having a series of strips of metal *i*, affixed thereto, and being steadied by a roller *j*, at the lower part; and the metal strips are caused, by the motion of the band *h*, to pass beneath a funnel, affixed to the seed-compartment *b*, and to receive the seed therefrom, which they deposit in successive portions on the land.

Fig. 2, exhibits a modification of the machine above described. In this machine, the endless band *h*, and strips *i*, are dispensed with, and a roller *l*, is used instead; the roller *l*, is placed beneath the lower ends of a series of funnels or spouts, down which the seed descends from the seed-compartment; and it is provided with projecting-pieces (as shewn in the enlarged view, fig. 3,) which, acting as substitutes for the strips *i*, receive the seed, and deposit it upon the ground in successive portions. The framing *m*, that supports the roller *l*, is suspended from the body of the machine by chains *n*; and rotary motion is communicated to the roller from the axle of the running-wheels by means of the endless chains *o*, *p*, and pulleys *r*, *s*. In some cases the patentee employs a revolving feed-roller, placed in the lower part of the seed-hopper, to cause the seed to flow into the upper ends of the funnels or spouts, as shewn at *q*, in fig. 1.

To bring the surface of the land, after it has been partially prepared, into regular rows, the patentee employs a plough, attached to the body of either of the machines above described, and with cutters or mould-boards placed in the positions represented at fig. 4.

The patentee claims, Firstly,—the improved machine for sowing and manuring land, first hereinbefore described, in the peculiar combination of parts of which the same consists; and of which combination the peculiar features are the modes of acting on the parts *e*, and *i*, so as to cause them to deposit the seed and manure in successive portions instead of one continuous stream. Secondly,—the modification of the said machine, secondly hereinbefore described, in so far as regards the placing of the revolving-roller nearer the ground and dispensing with the endless belt. Thirdly,—the attaching to the said machines, mould-boards or cutters, placed in the relative positions shewn at fig. 4.—[*Inrolled in the Inrolment Office, November,* 1848.]

To Enoch Wilkinson, *of Oldham, in the county of Lancaster, overlooker, for certain improvements in looms for weaving.*—[Sealed 9th February, 1847.]

These improvements in looms for weaving apply, principally, to power-looms for weaving fancy or figured goods, and consist, firstly, in an improved arrangement of mechanism for lifting and lowering the shuttle-boxes in looms wherein two or more shuttles are employed; secondly, in a certain novel arrangement of apparatus for dividing or shedding the warp-threads, so as to produce the required design or pattern in or upon the cloth or other fabric woven; and thirdly, in an improved form of shuttle, to be used in what are called "under-pick" looms, that is, looms wherein the "picking-stick," which impels the shuttle, projects upwards through the bottom of the shuttle-box.

In Plate XIII., fig. 1, is an end elevation of the driving end or side of a power-loom, with the improved lifting apparatus, for working the shuttle-boxes, shewn as applied thereto. A, A, is the side-framing of the loom; B, the yarn-beam; C, the breast-beam; D, the lathe or slay; E, is the crank-shaft; F, the main driving-pulley; and G, the cloth-roller. A small frame *a, a,* is placed at the side of the loom, carrying a transverse shaft or spindle *b*, upon which is a ratchet-wheel *c*, and also a bell-crank lever *d, d.* To the upper end of this lever is attached a catch *e*, which rests upon the curved guide *f*, *f*. The bell-crank lever *d*, *d*, is caused to vibrate to and fro at every revolution of the crank-shaft, by its being connected by the rod *g*, *g*, to the lever *h*, *h*, which has its fulcrum at *i*, and is furnished with a small crescent or half moon, working in a double scroll *k*, *k*, upon the crank-shaft. *l*, is a small cylinder, supported by a lever *m*, which is caused to vibrate at every "beat" of the lathe,—it being connected to the "slay-sword" *n*, by the rod *o*. Over the cylinder *l*, an endless tappet-chain *p*, passes; it is composed of small transverse strips of wood, fastened together with links, and provided with holes and small moveable pegs or tappets. The cylinder *l*, is caused to rotate one-sixth of a revolution, and thus advance the chain *p*, one link at every beat of the slay by the catch *q*, taking up one tooth of the ratchet-wheel *r*. The pegs or tappets upon the chain coming against the lower end of the guide *f*, *f*, hold the guide in the position shewn in the drawing,—thus keeping the ratchet *i*, out of gear with the ratchet-wheel *c*; but as soon as a blank space in the chain comes opposite to the guide *f*, *f*, the guide falls, and the vibration of the bell-crank lever *d*, *d*, causes the catch *e*, to take up one tooth of the ratchet-weel *c*, and turn the spindle *b*, one-sixth of a revolution; the tappet *t*, upon the said shaft raising or lowering the shuttle-boxes *u*, *u*, by means of the levers *v*, *v*, *v*, *v**. The lever *v**, is furnished with a small projecting piece, which bears upon a spiral spring *w*, and thus prevents the shuttle-boxes from falling too suddenly. The shape of the tappet *t*, is shewn best in the enlarged detached view, fig. 2, and that of the scroll *k*, in fig. 3.

Fig. 4, is an elevation of the reverse side of the loom, shewing the application of the improved apparatus for working the "jacks" and "treadles" for dividing the warp-threads, so as to produce the pattern required. The letters of reference upon the ordinary parts of the loom are the same as in fig. 1. *a*, *a*, is the framing of the apparatus, supporting a vibrating frame *b*, *b*, which carries a spindle or shaft *c*, upon which the inclined "shedding-levers" *d*, *d*, are mounted. *e*, *e*, are the "jack-lifters," which are connected by cords to the jacks *f*, *f*, above, and to the treadles *g, g,* below, to which the shafts or healds are tied in the usual manner. The frame *b, b,* is caused to vibrate by the crank-pin *h,* and link *i.* There is a smaller vibrating frame *k,* which carries the cylinder *l,* over which the endless tappet-chain *m,* passes; or an ordinary moveable tappet cylinder may be used. This chain is similar to the one above described, except that each strip of wood is provided with as many holes for the pegs or tappets as there are shafts or healds to be worked. The frame *k,* is caused to vibrate by the cam *n,* on the crank-shaft, being connected to it by the lever *o,* and rod *p;* and at every vibration the catch *q,* turns the cylinder *l,* one-sixth of a revolution. As the frame *b, b,* vibrates, it brings the inclined shedding-levers *d, d,* against the pegs upon the chain *m,*—thus raising those levers opposite to the pegs, and allowing those opposite to the spaces to fall by their own gravity; the frame *b, b,* then moves in the reverse direction (the cylinder and chain following) and the inclined plane of those levers *d, d,* that have fallen, coming in contact with the small rollers or bowls at the back of the jack-lifters *e, e,* raises them, and, by means of the jacks and treadles, divides the shed as required,—the remainder of the jack-lifters being kept down by their own gravity. There are two levers *r, r,* one at each end of the apparatus, connected together by a rod, upon which the jack-lifters *e, e,* rest, and which prevents them from falling too low out of the way of the inclined shedding-levers; the levers *r,* being acted upon by bowls *s,* fixed at each side of the vibrating frame *b, b.* There are guide-bars (not seen in the drawing) above and below the inclined levers *d, d,* to prevent them either rising or falling two much. It will be evident that the length of the chain and the situation of the pegs or tappets, both in this apparatus and that above described for working the shuttle-boxes, will depend upon the particular pattern to be produced; and also that various other kinds of endless tappet-chains may be employed, which will be well understood by the practical weaver. The cylinders are held firm and square by a spiral spring and T-shaped lever, similar to that commonly applied to the cylinders of "Jacquard machines." Fig. 5, is a side elevation of one of the jack-lifters *e*, and inclined shedding-levers *d*, shewn detached, and upon a larger scale. The patentee remarks, that where two shuttle-boxes are required at each side of the loom, the lifting apparatus may be worked from the same chain as the shedding apparatus, and the motion communicated to the other side by a shaft extending across the loom.

Fig. 6, shews a view of the under side of the improved form of shuttle to be used, as before described, in under-pick looms. The improvement consists in forming a recess *a*, in the under side of the shuttle, so as to have a square surface for the picking-stick to strike against, and also in having the points *b*, *b*, of the shuttle out of the centre, which renders them less likely to catch against the warp-threads, or stop in the shed.

The patentee claims, Firstly,—the application, employment, or use of an endless tappet-chain (of whatever construction), together with the apparatus above described and shewn in the drawing, for the purpose of raising and lowering the shuttle-boxes in looms where two or more shuttles are employed. Secondly,—the peculiar construction and arrangement of the inclined shedding-levers and jack-lifters, to be worked by an endless tappet-chain or cylinder, for the purpose of dividing or shedding the warp-threads, so as to produce the pattern desired. And, Thirdly,—the peculiar construction of shuttle to be used in under-pick looms, as above described and shewn in the drawing, whether the same be applied to the slide-shuttle or to the wheel-shuttle.—[*Inrolled in the Petty Bag Office, August,* 1848.]

To ALEXANDER PARKES, *of Birmingham, experimental chemist, for improvements in the manufacture of metals, and in coating metals.*—[Sealed 27th April, 1848.]

THE first part of this invention, which relates to the improvements in the manufacture of metals, consists in separating copper and some other metals from their sulphuretted ores into the state of regulus or coarse metal; also in obtaining the metal by one process or operation of melting from a regulus or other sulphuret of a metal.

In order to obtain a regulus of copper from a sulphuret, the patentee takes the usual precautions adopted by smelters to form a fusible slag; that is to say, by a due admixture of the ores themselves, or of the ore with other matters, as fluxes. To every ton of such ores, when containing about 10 per cent. of metal, he adds, either before or whilst the same are in the melted state, from 100 lbs. to 150 lbs. of sulphate of lime, or of soda, or of baryta, or of potash; he keeps the whole in a melted state until the regulus becomes separated from the earthy matters; and then he taps the furnace into sand or water;—sometimes, when operating in this way, he adds a carbonate or oxide ore, whereby he obtains a regulus more rich in metal. The regulus or product, thus obtained, may be treated in the usual way, to obtain the metal therefrom; or it may be treated in the manner hereafter described. The sulphuret ores of silver and antimony may be treated in the same way as the sulphuret ores of copper; but when the sulphuret ores of silver are to be operated upon, from 5 to 10 per cent. of scrap-iron should be added. Although only the sulphates of lime, soda, baryta, and potash are mentioned in the above description, yet the sulphurets of the same substances, and other sulphates and sulphurets, may be employed.

The mode of treating the regulus, obtained as above described, or other regulus or sulphuret of copper, in order to obtain the metal by one operation of melting, is as follows:—The principle on which the patentee acts is, to mix with a regulus or other sulphuret of copper such a metallic compound, that the oxygen which it contains shall desulphurize the sulphuret, in the act of melting, and allow the metal to separate. For this purpose, the patentee employs a carbonate or oxide of copper, and thereby obtains copper fit for refining by the ordinary process; or he uses a carbonate or oxide of zinc; in which case a great part of the zinc will form an alloy with the copper: when zinc is employed, it will be requisite to use the flux hereafter described. The sulphates of copper, iron, and zinc, will also answer; but they will require to be used in larger proportions than the oxides, and are not so advantageous. When reducing a regulus or sulphuret of copper, containing about 30 per cent. of copper, the patentee prefers to use a carbonate or oxide of copper containing the same per-centage of metal, and he takes equal quantities, by weight, of the two matters; but if the sulphuret contains more sulphur than is equivalent to the oxygen contained by the oxide, he adds a larger proportion of the oxide compound. He first fuses the sulphuret, removing any slag that forms previous to introducing the oxide or carbonate, which he does by degrees, occasionally removing the slag, and gradually adds about 10 per cent. of a flux, composed of carbonaceous matter and chloride of calcium or chloride of barium, in equal proportions: in from three to six hours the sulphuret will be decomposed and the metal separated.

The above process is also applicable to the sulphurets of silver and antimony. When operating upon the sulphuret ores of silver, the patentee prefers to obtain the regulus by the method above described for treating copper ores; and he subsequently decomposes the same by the carbonate of zinc or of copper, using therewith from 5 to 10 per cent. of scrap-iron. When a sulphuret of antimony is to be treated, if it contain much earthy impurity, it is fused in the manner described when obtaining a regulus of copper, and the product is calcined at a low temperature; the oxide, thus obtained, is fused with an equal quantity of sulphuret of antimony, which has not been calcined (a flux being added, as directed for copper); and thereby the metal is separated.

Sometimes, instead of using oxidized compounds of metal as the means of decomposing sulphurets of copper at one operation of melting, the patentee employs the oxygen of the air. He acts on melted regulus of copper (which should contain at least 30 per cent. of copper) in a reverberatory furnace, by causing currents of air, either hot or cold, to be forced in contact with the melted materials (suitable openings being made, for this purpose, in the fire-bridge, or in the roof or other part of the furnace); the slag is removed from time to time as it forms; and the sulphuret becomes progressively decomposed and the metal separated.

The improvements in coating metals relate to iron and steel, and consist in the use of an alloy composed of about nine parts of lead and three parts of antimony, or about nine parts of lead, one part of tin, and one part of antimony; these metals are fused and kept in a melted state beneath a flux of considerable depth, composed of chloride of barium or chloride of sodium, or a mixture of these two materials; and the articles to be coated, having been first carefully cleaned, are immersed in the melted metal until the desired coating is obtained.—[*Inrolled in the Inrolment Office, October,* 1848.]

To WILLIAM JOHN NORMANVILLE, *of Park Village, East, Regent's-park, in the county of Middlesex, Gent., for certain improvements in railway or other carriages,—partly consisting of new modes of constructing the axle-boxes and journals of wheels; also an improved method of lubricating the said journals or other portions of machinery by the introduction of aqueous, alkaline, oleaginous, or saponaceous solutions.*—[Sealed 2nd May, 1848.]

THE patentee commences his specification by stating, that very great labor and expense is at present incurred by railway companies in "lifting" railway carriages, for the purpose of removing worn out "brasses" and substituting others: much of this wearing out is consequent upon the introduction, during the running of the trains, of extraneous substances (dirt, grit, &c.) into the axle-boxes, between the rubbing surfaces of the journals and brasses, owing to the defenceless or open state of the backs of the axle-boxes; which dirt or grit, acting upon such surfaces, cuts or otherwise so injures them, as to render the brasses useless.

This invention consists in so constructing axle-boxes and journals of railway and other carriages and machinery, that they shall form air-tight vessels, for the purpose of guarding the rubbing surfaces from injury by dirt; and for the more effectual lubrication of such surfaces, such lubricating materials as are suitable for the purpose are introduced into the axle-boxes from vessels that are air-tight, except at the air-hole in the lid.

The patentee describes the application of his invention to the axle-boxes of railway carriages only, as the same means of effecting the above objects are applicable to other carriages, and to machinery. A shield, diaphragm, or collar, of vulcanized India-rubber, gutta-percha, leather, or other suitable elastic substance, either animal, vegetable, or mineral, is placed in the axle-box represented in Plate XIV., at figs. 1, 2, 3, and 4;—fig. 1, being a plan view of the axle-box; fig. 2, a section, taken on the line A, B, of fig. 1; and fig. 3, a section, taken on the line C, D, of fig. 1. In the centre of the shield or diaphragm *a*, a perforation is cut, with great care, by the employment of a lathe, to allow the arm of the axle to pass through; such perforation is made of less diameter than the actual diameter of the axle-arm, and, by the tendency of the material of which the shield is composed to collapse, it presses so closely to the axle that an air-tight joint is maintained. The diameter of the perforation in the shield or diaphragm for a four-inch axle should be three inches and five-eighths; the outer diameter of the said shield should be one-eighth of an inch less than the metal disc of the axle-box into which it is to fit; and it will then be found to fill it completely. To protect the elastic shield, a thin cast-iron or other metal shield *b*, (fig. 2,) is placed behind it, and secured to the axle-box *c*, by four bolts *d*, *d*, (fig. 1,); by tightening which, the outer side of the diaphragm is subjected to the requisite pressure, in order to produce an air-tight joint. In adjusting this shield *b*, care should be taken that the diaphragm is not compressed more than is necessary to make an air-tight joint; as, otherwise, it would press so forcibly upon the axle, that there would be considerable risk of the shield "firing" when the axle is put in motion, and before it could become properly lubricated. To prevent an accident of this nature, four leather washers, through which the bolts *d*, *d*, pass, are placed between the shield *b*, and the axle-box (such washers being of suitable thickness to prevent the bolts from being overtightened); and when that part of the elastic shield which is in contact with the axle has become so much worn as no longer to maintain an air-tight joint, the leather washers may be thinned, so as to allow the bolts to be tightened.

The patentee describes three modes of using the elastic shield;—first, where the edge of the perforation forms the joint round the axle; secondly, where a metal collar is also used; and thirdly, where a leather collar is used with the elastic shield. The first method, which has been described above, consists simply in passing an elastic shield over the arm of the axle, and securing it in the proper position by the metal shield *b*: when the elastic shield has become so much worn that an air-tight joint can no longer be maintained, a loose ring of India-rubber, of the same diameter as the axle, and about a quarter of an inch thick, may be placed upon the axle; and the original shield, whose orifice has become enlarged by wear, being then stretched upon this ring, will, by its contractile force, clasp it so tightly, as to maintain a perfectly air-tight joint between the two surfaces of India-rubber, while the axle revolves within the inner or loose ring; and the operation of tightening by means of the four bolts is repeated as required. The second mode of employing the elastic shield consists in placing a metal ring in contact with the axle, as shewn at *e*, figs. 4, and 5, (fig. 4, being a side view, and fig. 5, a transverse section of the axle,) and using the contractile force of the India-rubber shield *a*, to keep the metal ring in close contact with the polished axle: this ring should be in four parts, with the joints so arranged as to intercept the passage of the grease and yet allow the parts to close as the surface of the ring wears. The third mode of employing the elastic shield, and which is preferred by the patentee, consists in placing a leather ring on the axle (as shewn at *f*, in the sectional view, fig. 6,) and using the contractile force of the India-rubber shield *a*, to keep the leather ring in close contact with the axle: the leather ring is one inch wide and a quarter of an inch thick; a groove is turned upon it, in a lathe, to receive the edge of the elastic shield; and the collar is formed with a lap-joint (as shewn at *f*^{1}, fig. 7, which represents an edge view of the collar), to allow it to contract as the surface of the leather is worn away by the motion of the axle.

These axle-boxes should be filled with a saponaceous grease, in a semi-fluid state, so that it may flow towards the shield or collar and lubricate it without delay; because the India-rubber, or other material, being in close contact with and grasping the axle, would wear and become injured if the rubbing surfaces should be allowed to revolve without proper lubrication. It is not intended that free oils should be used in connexion with the improved axle-boxes, because they would be absorbed by the India-rubber, and so injure it; while grease, in ordinary use (which, however, must be in a semi-fluid state), may be used without injury to the elastic shield, even if the heat generated by the friction of the axle should bring the grease to the boiling point. The grease is introduced through a circular opening in the top of the axle-box (as shewn at *g*, in figs. 1, and 2,) which is closed by a lid, screwed or hinged thereon, and having an air-hole formed in it.

A modification of the above arrangements is shewn in the sectional view, fig. 8, in which vulcanized India-rubber is also used as a spring for maintaining an air-tight joint between the axle and axle-box; but in this case it operates by its expansive instead of its contractile force. The India-rubber ring *a*, is fixed to the axle; it is made three-sixteenths of an inch wider than the space it is intended to occupy, so that when compressed into the position shewn, it will press on one side against the nave *h*, of the wheel, and on the other side it will press a brass washer *i*, against a polished plate *j*, which is fastened by four screws to the axle-box, and forms the end of it. The India-rubber collar being a fixture upon the axle, necessarily revolves with it, and causes the washer *i*, [illegible] rub upon the polished surface of the plate that forms the [illegible] of the axle-box, and thus produce an air-tight joint. The [illegible]her *i*, is caused to revolve with the India-rubber shield, [illegible] two small studs or pins projecting from it, and pressing into the India-rubber shield. The other portions of the axle are the same as those before described. The grease intended to be used with this axle-box is that in ordinary use upon railways, and commonly called "Booth's grease."

The patentee claims, Firstly,—the peculiar combination of various elastic and other materials, as hereinbefore described, with the axle-box and journal, for the purpose of rendering the lubrication of the journals of railway wheels and other moving parts of machinery more perfect. Secondly,—the arrangements, hereinbefore described, for enclosing the lubricating material within a vessel, which shall retain it and exclude the dirt.—[*Inrolled in the Rolls Chapel Office, October*, 1848.]

To William Russell, *of Lydbrook, in the county of Gloucester, iron-master, for an improvement in the manufacture of such bar-iron as is used in the manufacture of certain kinds of rod-iron.*—[Sealed 29th January, 1848.]

This invention relates to the manufacture of that kind of bar-iron known as charcoal bar-iron, which is used for billets in the manufacture of wire rod-iron and horse-nail rod-iron; and the improvement consists in subjecting such bar-iron, during its passage through the rolls, to the action of a die or draw-plate, termed a "cleanser," whereby the spill and scale are removed from the surface thereof; which spill and scale would otherwise require to be burned off, when the billets are heated in the billet-furnace, to the great injury of the billet-iron. The cleanser consists of two plates, one or both of which is or are moveable up and down in a vertical slide; in the under edge of the upper plate, and upper edge of the lower plate, one or more grooves is or are made, corresponding in form with the section of those in the rolls, which, for this kind of bar-iron, are generally rectangular and of a V-form; and the grooves in the upper plate stand immediately over the grooves in the lower plate, so that when the two plates are brought together, the grooves form apertures corresponding to the sectional form of the bar-iron as it comes from the rolls. The cleanser is placed in front of the rolls, and its V-grooves are caused to stand exactly opposite a corresponding number of grooves at the finishing end of the rolls.

In Plate XIV., fig. 1, is a vertical section, and fig. 2, an elevation of the finishing end of a pair of rolls, with the cleanser applied thereto. *a*, is the bed-plate of the cleanser, which is secured to the bed-plate of the rolls; *b*, the vertical frame, bolted to the bed-plate *a*; *c*, the upper plate of the cleanser, having two grooves 1, 2; *d*, the lower plate of the cleanser, having two corresponding grooves 1, 2; *e*, a shaft, carrying an arm or lifter *f*, which acts in a recess in the moveable plate *d*, so that when the shaft is turned, by means of the lever *g*, the plate *d*, will be raised or lowered: *h*, *h*, are the rolls of the ordinary construction.

The iron is first converted, in the usual way, with charcoal, in a refinery, out of refined iron (called "mettle-iron"), and made into lumps, weighing about 1¼ cwt.; each lump is then taken to the hammer, and hammered into a bar, five or six inches square in the transverse section; and this bar is passed through the rolls until it is reduced to about one inch and a half square, when it will have arrived at the last two grooves of the rolls, where the cleanser is situated. The plate *d*, being lowered to the position shewn by the dotted lines in fig. 1, the iron is passed through the cleanser, and introduced into the last groove but one of the rolls; the plate *d*, is then raised, so as to gripe the iron tightly in the left-hand groove of the plates *c*, and *d*; and the iron being drawn through the cleanser by the operation of the rolls, the spill or scale is thereby removed from its surface. When the iron is clear of the rolls, it is passed back over the same, and then passed through the last groove of the cleanser, by which any remaining spill or scale will be removed. The iron may then be cut into billets, to be afterwards rolled into rods in the usual manner.

The patentee claims "the employment of a cleanser or scraper, in combination with the ordinary rolls, in the manufacture of charcoal bar-iron, to be used for billets in the manufacture of wire rod-iron and horse-nail rod-iron, in order to free the said bar-iron, so to be used as aforesaid, and at that part of the process of manufacture, from the spill and scale, which, if not then removed, would have, as heretofore, to be burned off, when the billets are heated in the billet-furnace, to the great detriment of the billet-iron."—[*Inrolled in the Inrolment Office, July,* 1848.]

To GEORGE COODE, *of Haydock-park, in the county of Lancaster, Esq., for an improved method or methods of distributing over land liquids and substances in a liquid or fluent state; and certain improved apparatus and machinery employed therein.*—[Sealed 11th March, 1848.]

THIS invention consists in distributing liquified manures, the drainage of towns, &c., with uniformity, and with as little violence as may be, over land, whether the same be cultivated or not; and also in certain apparatus for effecting this operation.

The patentee, in carrying out his invention, employs an apparatus termed a "distributor," of which he describes three kinds, called, respectively, the parallel, the radial, and the diametral distributors. The apparatus, in every case, consists of two principal parts, viz., first, of a long tube, of a conical shape, termed the delivery-pipe, perforated all over, or only in certain parts, with small holes, for the delivery of the liquid, and made either of some rigid material, such as metal or wood, or of some flexible fabric, such as canvass, enclosed in a rigid frame-work or cradle; and, secondly, of a flexible hose, for feeding the delivery-pipe.

First, with regard to the parallel distributor, the delivery-pipe is moved in a direction at right angles to its axis; it is formed with perforations, of equal dimensions, at equal distances apart; and it is mounted upon two wheels. There are two modes in which the parallel distributor may be supplied with liquid by means of the hose. In the first mode, the hose is made in pieces of convenient length (say 40 yards), having at their ends male and female screw union joints; and the pieces are laid in succession on the surface to be watered, in the direction in which the apparatus is to be moved, and doubled in the manner shewn at fig. 1, in Plate

XIV. One end of the first piece of hose is connected with the tank, reservoir, pump, or other source of supply, by one of the union joints, and the other end is secured to the feeding end (*i. e.* the largest end) of the distributor. The distributor being moved forward, carries with it the end of the hose, until the piece of hose is pulled out straight; then a compressor (hereafter described) is put upon it, to stop the flow of liquid, and to enable the hose to be detached from the distributor and connected with another piece of hose, laid as before mentioned; and the other end of the second piece of hose is connected with the distributor. The compressor being now taken off the first piece of hose, the liquid flows through the second piece to the distributor, which is then moved forward until the second piece of hose is pulled out straight; a third piece of hose is then connected with the distributor; and when this piece has been pulled out straight, a fourth piece of hose is added; and so on. When the distributor has traversed the whole length of the field or surface to be watered, it is brought back along the other side of the pieces of hose, dragging them successively into the original position in which they were laid, and is detached from each successively.

The compressor may be made of strong wire, bent into a rectangular shape, as shewn at fig. 2, with one end *a*, formed so as to hold fast a tongue *b*, through the enlarged end b^1, of which the wire passes, so as to form an axis whereon the tongue may turn; or the compressor may be made of the form exhibited at fig. 3, which is more suitable for cases where the liquid in the hose is under great pressure, and consists of two metal jaws *c, c,* hinged together at *d,* and connected at the other end by a screw and nut *e,* by which the amount of compression can be increased at pleasure.

The second mode of supplying the parallel distributor with liquid by means of the hose is as follows:—The delivery-pipe carries a reel, round which a piece of hose (say 36 yards long) is wound,—one end of this hose being permanently connected with the delivery-pipe, and the other end carrying part of the union joint by which it is connected with the hose that leads to the tank or other source of supply. This last-named hose is made in pieces about 200 yards long, furnished at their ends with union joints; upon this hose, at intervals equal to the length of the hose wound around the reel, are T-pieces, furnished with male or female screws, as the case may be; and at each T-joint a compressor is placed. The distributor being brought in succession to each T-joint, and the end of the coiled hose secured to the latter, the liquid flows through the coil of hose into the delivery-pipe, which is then moved on towards the next T-joint—the hose uncoiling as it advances. When the distributor has arrived at the next T-joint, the compressor is placed over the last T-joint; then the uncoiled hose is detached from it, and, after being again wound upon the reel, its end is connected with the second T-joint; and when this has been effected, the compressor is taken off the first T-joint, and the distributor is moved onward as before.

Secondly,—with regard to the radial distributor, the delivery-pipe is moved radially around a central point, where its feeding end is connected with the supply hose, and is supported by a pivot moving on a tripod; at a convenient distance from the other end it is supported by a pivot, moving on a carriage furnished with two wheels, which turn like the front wheels of a four-wheeled carriage; and the pipe is made with numerous perforations, increasing in number or sectional area as the square of the distance from the centre. The hose to supply the delivery-pipe is provided with T-joints; but the T-joints are placed in this case at the distance of twice the length of the delivery-pipe, less the versed sine of 60°,—the length of the pipe being the radius. The delivery-pipe will describe a circle round each T-joint; and each circle will overlap a portion of each adjoining circle: therefore, to prevent a double distribution of liquid at the points of intersection, the passage of the liquid is stopped by compressing the pipe, when it is flexible, or by means of a ball-valve within it, when the tube is inflexible.

Thirdly, with regard to the diametral distributor, the delivery-pipe is mounted at the centre of its length upon a standard, on which it turns, so as to distribute the liquid over a circular space in half a revolution. The delivery-pipe has numerous perforations in it, increasing from the middle to both extremities, in number or sectional area as the square of the distance from the centre. The standard consists of a tube, moving, by means of a telescope joint, in another tube which carries part of the union joint for connecting the hose therewith; and the standard is fixed in a carriage similar to a wheelbarrow. The hose is provided with T-joints, similar to that used with the radial distributor; but the T-joints are set at intervals equal to one diameter, less the versed sine of 60°,—the length of the delivery-pipe being the diameter.

The patentee claims, as his invention, the distributing of liquids and substances in a liquid and fluent state, by means of the three several arrangements and combinations of apparatus and machinery above described, one or other, or all of them, and according to the peculiar method or methods also above described. He also claims the use of conical delivery tubes and of hose for coiling around reels, both constructed as above described, for the distribution of liquids and liquid substances, whatever may be the method or methods according to which the same are employed.—[*Inrolled in the Inrolment Office, September,* 1848.]

To HENRY GILBERT, *of Saint Leonard's-on-the-Sea, in the county of Sussex, surgeon, for an improved mode or improved modes of operating in dental surgery, and improved apparatus or instruments to be used therein.*—[Sealed 20th April, 1848.]

THE first part of this invention consists in so arranging apparatus that a fixed bearing, independent of the extracting instrument, may be offered to the forceps or instruments used for extracting teeth; and the patentee prefers that such apparatus and fixed bearing should be applied to a chair; but this is not essential, so long as a suitable fixed bearing is brought into a proper position, as hereafter described.

In Plate XV., fig. 1, is a front view, and fig. 2, a side view of a chair, provided with a fixed bearing, according to this invention; fig. 3, is an elevation of part of the apparatus, on an enlarged scale; and fig. 4, is a horizontal section, taken in the line 1, 2, of fig. 3. *a*, is a rod or stem, fixed at one side of the chair; *b*, is a socket, capable of sliding on the stem *a*, and of being fixed at any required height by means of the set-screw *c*, which, on being turned, presses the piece *d*, (shewn, in side and edge views, at figs. 5,) against the stem; *e*, is another socket, fixed to the socket *b*, and holding the rod *f*, which is retained in any desired position by the set-screw *g*, pressing the piece *h*, against the rod; and *i*, is the fixed bearing (shewn separately, in edge view, at fig. 6,) the stem of which enters a socket at the end of the rod *f*, and is retained therein, in any required position, by the set-screw *j*. Although the patentee prefers this form of fixed bearing, he does not confine himself thereto. When a front tooth is to be extracted, the bearing *i*, cannot be introduced between the upper and lower teeth, and the patentee therefore places upon the bearing *i*, a sliding-piece *k*, (indicated by dotted lines in fig. 3, and shewn separately, in plan and edge views, at figs. 7,) which comes against the teeth on one side beyond the one to be extracted. The back of the chair is hinged to the seat, and rests against a rail at *l*, so that, by drawing the seat forward, the back may be made to incline to any required extent. The patentee makes no claim to any part of the chair; but he prefers to employ a chair of the form shewn at figs. 1, and 2.

The teeth are extracted, by means of the ordinary forceps, in the following manner:—The operator first causes the person to recline back in the chair, and adjusts the bearing *i*, so that it will come between the jaws (when a back tooth is to be extracted); he then takes hold of the tooth with the forceps, which will rest on the bearing *i*, if a lower tooth is to be extracted; and, by moving the forceps upon the bearing *i*, as a fulcrum, he lifts the tooth out of the lower jaw. If a tooth is to be extracted from the upper jaw, the forceps are introduced below the bearing *i*, and act to draw the tooth downwards out of the jaw. The bearing *i*, and sliding piece *k*, should be covered with any soft fabric or substance.

The subject of the second part of the invention is an instrument for drawing out the stumps of teeth, which is represented at figs. 8, 9, and 10; it consists of a fixed claw *m*, and a moveable claw *n*. When in use, the fixed claw rests against one side of the stump, and the moveable claw is pressed by the finger or thumb of the operator against the other side, so as to hold the stump firmly between them; then, the stem of the instrument resting against the fixed bearing *i*, above described, the operator can readily extract the stump. The patentee states, that this instrument is very similar, in respect to the moveable claw, to what has before been used, and is commonly called the key instrument; but in such former instrument there was no fixed claw used in such manner as to hold the stump between two claws, as in the present instrument.

The patentee claims, Firstly,—the improvements in extracting teeth, above described, whereby a fixed bearing is employed to rest the extracting instrument on or against. Secondly,—the improved instrument or apparatus above described.—[*Inrolled in the Inrolment Office, October,* 1848.]

To John Coates, *of Seedly, in the county of Lancaster, calico printer, for his invention of certain improvements in machinery or apparatus for cleaning the surface of woven fabrics, or freeing the same from fibrous or other loose matters, previous to printing thereon.*—[Sealed 27th April, 1847.]

These improvements in machinery or apparatus for cleaning the surface of woven fabrics, or freeing the same from fibrous or other loose matters, consist in the employment, for such purposes, of a revolving cylinder or roller, covered with wire cards (such as is used in the carding of cotton), either in connection with a stationary brush or without it; which apparatus may be either attached to the ordinary printing machine for printing calicoes or other woven fabrics, or to the winding machine for preparing the cloth-roller used in such machinery, or used separately from either. This apparatus is to be applied to the surface of calico or any woven fabric, to clean it from loose fibres or other extraneous matters, previous to printing thereon, and thereby preventing the occurrence of imperfect work, frequently arising from the presence of such loose matters, and also increasing the capability of producing more work in a given time. The card-cylinder or roller and brush, or any other modification of a similar cleaning apparatus, may either be used separately or detached, if preferred; or may be attached to, or in connection with, the ordinary calico printing machine, as herein described, and placed between the cloth-roller and the printing-roller; or it may be employed in any other convenient situation.

In Plate XIV., fig. 1, shews a plan view of an arrangement of mechanism, which is suitable to the above purposes; fig. 2, is an end view, and fig. 3, a section of the same; fig. 4, is a diagram, shewing the relative position of the apparatus when used in connection with the ordinary calico printing machine. *a, a,* is the side-framing of the apparatus, connected together by the rods *b, b,* and supporting the tension-rail *c, c,* under which the cloth passes, and thence over the stationary brush *d, d,* which has a "doctor" or steel blade *e, e,* extending along one side. The cloth then passes over the wire card-cylinder or roller *f, f,* and over the tension-roller *g, g,* to the printing apparatus. The roller *g, g,* may be covered with felt or cloth, if preferred, to allow of the stretched calico or other woven fabric, as it passes over the roller, giving it a revolving motion, and thus, by means of the spur-pinion *h,* and wheel *i,* turning the wire card-cylinder or roller *f, f,* in the reverse direction. The calico or other woven fabric, while passing over the stationary brush *d, d,* and "doctor" *e, e,* and subsequently over the revolving card-cylinder or roller, becomes thoroughly brushed and cleaned from any loose material which may have adhered to it;—thus causing the fabric to present a much smoother or better surface for printing. The brush *d, d,* and the wire card-cylinder or roller *f, f,* may be adjusted by the screws *k, k,* and a slight lateral or traversing motion may also be imparted to it, perhaps, in some instances, with good effect; or it may also be placed, in other instances, in an oblique direction to that of the cloth. When the apparatus is not desired to be at work, the tension-rail *c, c,* may be thrown into the position shewn by dotted lines at fig. 3, by means of the lever *l*:—the cloth will then pass over the roller *g*, *g*, without touching the brush or the said card-cylinder or roller.—[*Inrolled in the Petty Bag Office, October*, 1847.]

To GEORGE PHILBRICK SWINBORNE, *of Pimlico, in the county of Middlesex, gent., for certain improvements in the manufacture of gelatinous substances, and in the apparatus to be used therein.**—[Sealed 24th November, 1847.]

THE patentee commences his specification by stating that heretofore, in manufacturing gelatine, it has been usual (with one exception) to act on large pieces of hides or skins, and to employ acids or alkalies, together with mechanical and other processes, which occupy considerable time and are likewise costly; and in the excepted case, above referred to, it has been the practice to reduce the pieces of hides into the state of pulp in a paper machine, and then to employ blood to purify the product obtained.

This invention consists in the following more simple mode of manufacturing gelatine:—The patentee takes hides or skins, or parts thereof, as fresh and sweet as possible, and free from hair, and he reduces the whole into shavings, or thin slices or films, by any suitable instrument; he soaks the shavings or films for about five or six hours in cold water, and then changes the same; he repeats such changing of the water two or three times each day, until no smell or taste is to be detected, either in the water or in the shavings; and then he removes the shavings from the water. If this product is intended for soup, it is dried on nets, and is then ready for use. If gelatine is to be extracted, the shavings, after the above soaking, are put into a suitable vessel with a quantity of water, sufficient to cover them when pressed down, and they are subjected to a heat not exceeding boiling water. When dissolved, the gelatine is to be strained through linen or other fabric, subjected to slight pressure by the hands or otherwise; or the solution may be permitted to run off from the vessel without straining, by which means much of the gelatine will be separated from the fibrous matters. The product of gelatine, thus obtained, is run in thin films on to a smooth surface of slate or other suitable material, to set; it is then removed on to nets, to dry; and, when dry, it is cut up with an isinglass cutter or other suitable apparatus. The residue, dried or not, may be used for thickening soup and other culinary purposes.

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* By a Disclaimer, dated 24th May, 1848, the patentee has erased the words "and in the apparatus to be used therein" from the title of his patent.

Another manufacture of gelatinous substances is produced by the following process (which forms part of this invention) from cod sounds or other fishy matters capable of yielding gelatine:—These matters are reduced to shavings or thin films, soaked in water, subjected to the action of heat, and the gelatine strained or run off, as above described. The patentee obtains a first, second, and third product of gelatine, which he forms into sheets, and, when dry, cuts up the same with an isinglass cutter. This manufacture of gelatine will be found highly useful as a cheap substitute for isinglass for clarifying liquids.

The patentee claims, as his invention, manufacturing gelatinous substances by reducing the matters, before mentioned, into shavings or thin slices or films, and treating them as above described.—[*Inrolled in the Inrolment Office, May,* 1848.]

To THOMAS GILL *and* JOHN EDGCUMBE GILL, *of Plymouth, manufacturers, for improvements in the manufacture of manures.*—[Sealed 8th April, 1848.]

THIS invention consists, firstly, in the manufacture of superphosphate of lime from bones by the use of sulphuric acid and artificial heat; secondly, in the manufacture of manure from bones by the use of muriatic acid; thirdly, in the manufacture of manure from bones by the employment of nitric and acetic acids; fourthly, in the manufacture of manure from bones by dissolving them in acid and then precipitating the manure therefrom; and, fifthly, in separating fat from bones in the act of manufacturing manure therefrom.

The patentees state, that under the term bones they mean to include bones (whole, ground, or crushed), bone-earth, animal charcoal, fossil bones, and mineral phosphate of lime (apatite); they generally operate upon bones in a whole state; and the following description is applicable thereto; but it is equally applicable, with the simple allowance for the difference in the materials, to each of the matters just mentioned. To manufacture superphosphate of lime from bones, the latter are dissolved by sulphuric acid in a leaden or other pan, which is fixed on the roof of a drying furnace, so that the fire-place at one end of the furnace will serve to heat the pan and to dry the products which have been removed from the pan on to the bed of the furnace. When the bones are sufficiently dissolved, the contents of the pan are syphoned or dipped off, and passed through a hole in the roof of the furnace on to the drying bed below; and the pan is recharged as before. The product on the drying bed is now worked at a moderate heat: it will be found that the gelatine of the bones has been so well preserved intact, and consequently with the preservation of its nitrogen, that if drawn from the drying bed without being subjected to further manipulation, it would come out in such a waxy state as would seriously interfere with its general usefulness; it is therefore advisable, while the product is in a fluid or semi-fluid state on the drying bed, that a portion of bone-earth, or other suitable substance, such as dry gypsum, should be added to it and well incorporated therewith; so that the product, when drawn from the furnace, may be in a sufficiently granulated state to be easily made available for the purpose of manure. When the dissolved bones are removed from the pan, the bottom will be found to be covered with a fine deposit of sulphate and phosphate of lime, which is to be removed with a wooden shovel and placed upon the drying bed. After the charge has been withdrawn from the drying bed, it is to be sifted, and the bone, &c., thus separated, may be calcined, and the ashes mixed with the next charge upon the drying bed. For every 100 parts, by weight, of bones, the patentees employ 60¾ parts, by weight, of sulphuric acid at 80° Twaddle, or 1·400 sp. gr.; that is to say, whatever may be the specific gravity of the acid, such a quantity must be used as will represent 31 parts, by weight, of acid at 1·845 sp. gr. If burnt bones or fossil bones are to be operated upon, an analysis of the same must be made, to determine the quantity of acid requisite to be used.

When liquid muriatic acid is used, a solid pulverulent form of phosphate of lime (which the patentees propose to call muriphosphate) is obtained by operating in the manner above described for making superphosphate of lime. To every 100 parts, by weight, of bones should be added as much liquid muriatic acid as shall contain 20 parts, by weight, of muriatic acid gas: the patentees state that acid of 1·090 sp. gr. is the best for this purpose, "as there is no loss of acid by evaporation, and a greater bulk is brought to bear upon the bones,"—acid of this specific gravity is used in the proportion of 109 parts, by weight, to 100 parts of bones. The patentees sometimes vary the method of drying the product, by introducing dry sulphate of lime, or other suitable substance, having an affinity for water, into the pan above the furnace or on to the drying bed. Sometimes, in place of using liquid muriatic acid, the patentees employ the gas or fumes of that acid, given off in various processes, such as the decomposition of common salt; for this purpose they place bones in the towers, chambers, or galleries, instead of the matters now employed; and they condense the acid in other respects, in such towers, chambers, or galleries, as heretofore practised. The acid fumes decompose the bones; and the condensed liquid acid is used for acting upon other bones. The fumes or vapours of other acids may be employed in the same way.

Nitric and acetic acids may be used for decomposing bones in like manner to what has been above described, with respect to sulphuric and muriatic acids; but the patentees prefer to use nitric or acetic acid (or it may be muriatic acid), in such manner as to obtain a precipitated manufacture of manure from bones, which only renders it necessary for them to employ the absolute quantity of acid required to neutralize the lime contained in the bones as carbonate of lime, in place of using the acid in excess as heretofore, and as is the case in the above described processes. When using nitric or acetic acid, the patentees prefer to employ earthenware vessels, heated in any convenient manner. The patentees obtain precipitated bone dust by putting a quantity of bones into a vessel and covering them with acid; when the bones are dissolved, more bones are to be added (each succeeding quantity of bones acting as a precipitant of the matters previously in solution), until the acid will not dissolve any more; and then the charge is removed to the drying bed.

When some classes of bones are subjected to the action of acid, the oily matters which they contain rise to the surface; these matters are skimmed off, washed, and used for making soap or any purpose to which they may be applicable.

The patentees claim, Firstly,—the manufacture of superphosphate of lime from bones by employing acid and artificial heat. Secondly,—the manufacturing of manure from bones by employing liquid muriatic acid and so conducting the manufacture as to obtain a dry or granulated manure; also the applying vapours or fumes of muriatic or other acid to bones in the manufacture of manure therefrom. Thirdly,—the application of nitric and acetic acids in the manufacture of manure from bones. Fourthly,—the manufacture of manure from bones by precipitating the same from a solution of bones. Fifthly,—the separating of fatty matters from bones when dissolving the same in the process of manufacturing manure.—[*Inrolled in the Inrolment Office, October,* 1848.]

To THOMAS RICHARDSON, *of Newcastle-upon-Tyne, chemist, for improvements in the manufacture of manure.*—[Sealed 26th May, 1848.]

THIS invention consists in manufacturing manure by dissolving animal matters, containing phosphates of lime and magnesia, in the liquor of the alum-works, known as "salts-mothers," or in a solution of "rough Epsoms."

The animal matters, such as bones or guano, are mixed with a small proportion of nitrate of soda, potash, lime, or magnesia, or nitric acid, in an iron pan, lined with sheet lead, and heated from below; then a certain quantity of the salts-mothers or solution of rough Epsoms (as hereafter mentioned) is added, and the whole boiled until the animal matter disappears. The pan should be about eighteen feet long, six feet broad, and eighteen inches deep. The quantity of the phosphates of lime and magnesia contained in the animal matters must be first ascertained; and then to every seventy-five pounds thereof should be added one hundred gallons of salts-mothers or three hundred pounds of rough Epsoms (dissolved in as little water as possible), with a quantity of one of the above-mentioned nitrates, depending upon the nature of the animal matters operated on: when bones are used, the nitrate or nitric acid is to be employed in the proportion of one pound to every twenty-six pounds of the bones; but only half the proportion will be necessary when treating guano.—The animal matter is to be reduced to powder under a pair of edge-stones previous to being mixed with the other materials.

The patentee states, that to economize fuel, a portion of rough Epsoms may be dissolved in the salts-mothers, as a substitute for the latter, in the proportion of about three pounds of rough Epsoms for every gallon of salts-mothers.

The liquid in which the animal matter has been decomposed will present the appearance of a thick magma; it should be evaporated to such a consistence as will admit of its being removed to a drying floor; and then the remainder of the water is to be expelled, at a temperature which should never rise sufficiently high to injure the animal matter: the patentee prefers a temperature of about 300° Fahr. When dry, the manure is ground to powder, and is then ready for use.

The patentee claims, Firstly,—the use of salts-mothers or rough Epsoms, dissolved in water, separately or mixed, for the purpose of dissolving and decomposing animal matter containing phosphates of lime and magnesia. Secondly,—the use of nitrate of soda, potash, lime, or magnesia, or nitric acid, in conjunction with the above, for the same purpose.—[*Inrolled in the Inrolment Office, November*, 1848.]

Scientific Notices.

ON THE DEVELOPMENT OF SCIENCE, AND ITS RELATION TO MAN'S SOCIAL ADVANCEMENT.

However much thinking men, in different ages of the world, may have varied, with regard to their opinions in science, philosophy, the destiny of man, and other subjects of enduring interest, they seem to have enjoyed at least one notion in common, viz., that the particular period at which they severally trod the earth, was destined to form a memorable epoch in the world's history. The cause of this unanimity of opinion—discrepant only as to date—is obvious enough, for the passing events in which these reflecting men participated as actors or advisers, or of which they were at least eye-witnesses, would naturally awaken in them an interest far surpassing that which would arise from the acquirement of a knowledge of events of an earlier period, perhaps but imperfectly recorded, or subdued in vividness of outline by the mellowing hand of time. It would seem to be a natural failing of the human mind to lay too much stress upon present or surrounding objects, and allow them to engross all our thoughts; hence the benefit of looking beyond the present; for, by a contracted mental vision, self becomes unduly exalted; and the occupations of self are considered the only ones worthy of our own attention and of the world's consideration. We have abundant instances, in every-day-life, of the importance into which the most trivial matters are expanded by those whose narrow sphere of usefulness gives them little opportunity of enlarging their knowledge of what has been, and is continually being, achieved around them. If, in a fit of philanthropy, we are led to enquire by what means the dull boor is to be raised from his plodding sphere, and awakened to loftier aspirations than, in his happiest moments, he had ever dreamed of, we shall have the pioneer to refinement presenting himself in the shape, perhaps, of a self-sufficient dancing-master, who, with the most perfect gravity, will declare, that the only true and certain mode of curing the evil is to begin with the reformation of the outward man; for, until the softening influences of Terpsichore have been felt, he must necessarily remain a savage. Should we desire to see his taste refined, *M. le Cuisinière* is at hand, to work with magic art directly, on the basis of all taste—the palate; for who, unpossessed with discernment to appreciate delicately-flavored viands, can be expected to discriminate between less positive refinements. It would be, in fact, almost endless to enumerate the diverse branches of *practical science*, the knowledge or the appreciation of which is made by their several votaries to appear as the *sine quâ non* of a tolerable specimen of the social animal. And perhaps it is as well, in the present transition state of society, that we are unconsciously led to magnify the importance of our several pursuits; for, in the attempt to gain converts to our creed, we are creating for ourselves a higher standard for exertion, which cannot but result in a desire to improve and develope the resources of our art or calling. We would not, therefore, check this feeling, much less would we decry that analogous one to which we above alluded, of the "now-time" being a turning-point for good or evil in the world's history; for it is a theme on which the greatest minds would find ample scope for all their powers; while to the possessor of the humblest intellect it might form a subject for contemplation, capable of imparting a disinterested impulse to his actions, which no other mundane consideration could bestow;—inasmuch as this progress of the world involves the early or late completion, and consequent enjoyment of the fruits, of man's greatest and noblest achievements, which may be summed up in that trite but copious expression, the *destiny of mankind.*

As the realization of this, the ultimatum of all human exertion, is at least the avowed, if not the real object of most of the great movements of the present day, it is highly desirable that the term itself, being in such constant use, should have a precise and generally accepted meaning; but, unfortunately, the differences upon this point are as wide as the poles asunder. Without arrogating to ourselves the office of the divine, we would, as a prelude to the consideration of the bearing on the present epoch of some of the great events of recent times, ascertain the value of the expression—"the destiny of mankind," and how far the destiny of man (his earthly condition being of course our limit) is placed in his own hands; and, since philosophers are as entirely at variance on this matter as are our modern political and social mountebanks with each other, we are constrained to refer, for guidance in our enquiry, to that short, yet ample, account in Holy Writ, of the condition of the progenitors of the human race before and after "the fall." We are there informed, that the penalty set upon that one transgression, the nature of which we have, perhaps, received only in a figure, is *death;* but after the transgression, we find the announcement of a commutation, through the virtue of a Mediator, of this punishment which man should have suffered; and appended to this announcement, is a denunciation of certain penalties, the infliction of which is too amply proved by the experience of all mankind. Now, if, in contemplating the workings of an Allwise Creator, we bear in mind that *mercy* is His peculiar attribute, and that, in the exercise of His mercy, a way was found for man's escape from a spiritual doom by the interposition of a power superior to man, because of his own utter helplessness, we may reasonably infer, that the withholding from him of aid, by which he might also escape the temporal penalties, was for this reason—that he possessed the power within himself of effecting that emancipation. Whether or not this be really the case, time only will determine; but if the belief be not presumption, we would desire that it should be universal; for, instead of that vague and misunderstood term—"the destiny of mankind," which, in its undefined nature, is the *ignis fatuus* at present sought after by too many of the human race, we should then have before our mind's eye a clear and definite object for our exertions—the mitigation and eventual removal of those curses which made Eve to groan as she became a mother, and Adam to mourn for the barrenness of the hitherto fruitful earth.

A rapid glance at the progress which man has already made in conquering the earth will add an air of great probability to the inference we have drawn as to the destiny of mankind; whereas, an opposite conclusion, if systematically acted upon, would throw us back into a state of barbarism. A familiar, but revolting instance, presents itself, of man's attempting to aid in the carrying out of a wide-spread, although not universal, curse, instead of attempting, as every feeling heart should do, to mitigate its severity; and as it well illustrates the inverse of our position, we cannot but notice it. This is the continuance and encouragement of slavery under the plea of fulfilling that denunciation upon Ham, "A servant of servants shall he be unto his brethren." If, then, our position can be maintained, man's destiny is to achieve the annihilation of bodily pain, and the mastery over that grievous taskmaster—*necessity*.

We have now arrived at an age in which, from the spread of civilisation, something like security is ensured to the accumulations of industry; and we have not, therefore, to endure, except in a modified form, the oppression of our fellows. A great advance has thus been made, as regards the easement of toil, from the certainty of the industrious enjoying the reward of labor; yet, even at the present day, in too many instances, the lot of honest and willing industry is but a little remove from the forced labor of the galley slave In the development of chemical science, we have recently had ample proofs of the possibility of preventing bodily pain, under a variety of different circumstances; and in the increased knowledge of the structure of the human frame, from which a more just and certain mode of treatment will result, we may reasonably hope for a still further proof of man's power, in diminishing corporeal suffering; while, as if to shew that there is no physical law why bodily suffering should be deemed inevitable, we have living instances (rare and isolated though they be) of frugal men who have enjoyed a long life without one day of sickness.

For the task of carrying out either of the two grand objects which we have defined as the destiny of mankind, viz., the annihilation of pain, and the amelioration of toil, it is obvious, that no one mind is equal, but it is to the accumulated labor of ages that we must look for the accomplishment of this work; it is, nevertheless, as much the duty of each individual to assist, by a contribution equal to his endowments and opportunity, in collecting and piling up the mountain of knowledge, from which the grand secrets for man's social regeneration are to be exhumed, as it would be for him to act, were he able by his sole exertions to remove the cause of his fellow creature's miseries. To attempt to hinder the unavoidably slow progress of this great work cannot be the part of a sane man. Now, whatever of moment is effected by man, is necessarily a result of the workings of his reason or imagination, acting under the guidance of his understanding; for, in brute force, he is conspicuously deficient as compared with the tenants of the forest; and it is from the evidently increasing attention which is now being given to the development of the mental, in preference to the physical, part of man in this country, as elsewhere, that we are disposed to think the present age will shew a great advance towards the accomplishment of man's destiny. It is a favorite pastime for sanguine minds to run through the list of wonderful discoveries which the present century has in unprecedently rapid succession brought forth; and to contrast the comforts, thus afforded us, with the inconveniences of an earlier age; and when that is done the reflection ends: but when the thoughtful man sees, by the introduction of some new discovery in chemistry or mechanics, a manufacture poisonous to the workman, or a loathsome occupation, degrading to all proper self-respect, suddenly swept away, he feels that the curse, "In the sweat of thy brow shalt thou eat bread," is thus far withdrawn; and how powerful must be that assurance in promoting further exertion!

Here, then, is not a definite object merely, the realization of which may be so distant as to damp the ardour of the most enthusiastic, but every forward movement towards the desired end can be clearly traced by the careful observer. The work must proceed even if we, neglectful of our destiny, labor only for sordid gain; but if we are actuated by a feeling that we live not merely for ourselves, nor even our nation, but for the whole world, that same power which nerves the patriot to perform such wonders when his country is in danger will expand in us in proportion to the field of our exertions. With such a beacon of hope the wealthy should be stimulated to employ their possessions wisely, and the learned to apply their hoarded knowledge.

In our almost daily experiences we are reminded by the progress of events that the "now time" is pregnant with some new and merciful answer to that prayer which the poet of our age has so well voiced—

"Grant us, All-maintaining Sire!
That all the great mechanic aids to toil
Man's skill hath formed, found, rendered,—whether used
In multiplying works of mind, or aught
To obviate the thousand wants of life,
May much avail to human welfare now
And in all ages, henceforth and for ever!
Let their effect be, Lord! to lighten labor,
And give more room to mind, and leave the poor
Some time for self-improvement."

To this end we are well assured the development of science is rapidly tending; for there are few branches of industry in which the condition of the workman has not been ameliorated by modern inventions. Manual exertion has in many instances given place to mechanical power, thus rendering greater facility in production, while the powers of the workman's mind have been more or less called forth to guide the mechanical operations. We have said that few branches of industry have been overlooked by that gentle innovator—improvement; and so it is, for whether we look to the printing-press, that mighty agent for feeding the mind—to the machine which displaced the laborious flail and aids in preparing food for the body—to the apparatus which almost instantly transmits our wishes to the remotest spot—or to that giant power which carries us bodily over land or sea, we shall find a vast amount of human labor softened by the influence of applied science: to set a value on the general good these inventions have conferred would be impossible.

We have heard much of late of that fascinating doctrine for uneducated minds, *equality;* and no wonder that it is at present in vogue, since it finds an echo from a deep-seated feeling in the human heart, and only requires a little fanning to bring it to a blaze; whereas the commotions of Europe have been more than sufficient, even in quiet times, to give it spontaneous ignition. But as our land has been preserved from intestine slaughters, whilst most of the European capitals have been the scene of riot and bloodshed, we may presume, in the absence of evidence to the contrary, that some pervading influence has knit all classes into one fellowship, and thus saved us from more than a taste of this doctrine in a very modified form. If such a union really exists without a manifest exciting cause, it must be considered as a peculiarity of the present epoch, for none can be so ignorant of history as to assert that the world has hitherto enjoyed such an approximation to a unanimity of interest. Now, as far as our experience in the study of human nature has gone, we have found but one feeling which, in the absence of threatened danger, could produce the fusion of class interests, and that is, *mutual dependence.* There is, we believe, no other power, nor can there be, which tends to the establishment of a just "equality;" for trust or confidence, the groundwork of all unanimity, is naturally associated with this dependence. We would, therefore, beg of the demagogue, instead of inflaming the minds of the ignorant, to look at the increasing power (although not political) which is being daily thrown into the hands of the class which he desires to incite,—to consider the increasing confidence with which all classes intrust them with their lives and limbs—over viaducts, through tunnels, on the edge of precipices, and between gorges of rocks, when, by but a malicious touch, they might be hurled to destruction,—and then to ask himself whether the class, whose interests he pretends to be advocating, is not daily rising in public importance. In all our large towns where the light that we burn and the water that we drink are respectively fed to us by a general channel, this mutual trust is exemplified; for if these supplies were tampered with at their source, we should all be equally sufferers. A thousand other instances could be adduced of mutual dependence, which ever must beget mutual trust, as the establishment of insurance companies, and of societies for protection from fraud, will testify; and thus, though in the complication of our social interests we are open to danger from all quarters from the designs of the rogue, or at the hand of the revengeful man, yet we live in security, and are continually exhibiting fresh proofs of confidence in each other. Even the lawless depredators of our streets, if we may rely upon the authority of a pamphlet now before us,* have begun to feel, that to be outcasts of society, and thus entirely self-dependent, is not the most enviable lot of man; for, at the call of the humane, they have assembled to state the origin of their criminal life, thereby to warn others of their danger, and to beg of the legislature, through the medium of that enlightened philanthropist, Lord Ashley, a passage from the scene of their crimes to a land where, unexposed to temptation, they may shew their sincere contrition. The subject of our mutual social dependence, although deserving of grave consideration, has yet received but little attention; we cannot, however, at present, dwell further on this point; it is enough for us that we have touched upon certain public improvements which, having originated or become greatly developed in our own time, shews clearly that the present is the age of all others that the world has yet seen most pregnant with interest as respects the working out of the destiny of mankind; and although it is a labor in which all nations should participate, yet we would, without egotism, but even as true patriots, exclaim with the poet—

> "May our country ever lead
> The world, for she is worthiest; and may all
> Profit by her example, and adopt
> Her course, wherever great, or free, or just."

Report by the Academy of Sciences, Paris, on a Memoir presented to the Academy, by M. L. Pasteur, *under the following title:— Enquiries into the relation which may exist between crystalline form, chemical composition, and the direction of rotation.*

[Translated for the London Journal of Arts.]

The subject of the enquiries undertaken by M. Pasteur is one of the most important which chemists can take an interest in. By discovering in the exterior form of crystallizable substances, distinctive characteristics which are found to bear relation to their molecular action, the man of science is furnished with the elements of investigation, which, under certain circumstances, will serve instead of having to trace their action by actual experiment.

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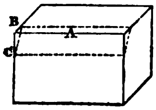
* "The Employment of the Poor." By C. Cochrane, Esq.—Chapman and Co., Shoe Lane.

Such relations are, no doubt, somewhat remote; for the peculiarities of the configuration of crystals, even when viewed through a microscope, are phenomenal results, brought about by a concurrence of molecular actions, the number of which is almost infinite. But the identity of the material groups, which unite to form a continuous and homogeneous crystal, combined with a similarity of their apposition, will, it is very reasonable to suppose, produce, in many cases, effects which, having always the same distinguishing features, furnish us with certain guides to their peculiar and individual action; which guides are doubly advantageous, from the facility they present of at once arriving at the truth;—and further, as they will at a future time, offer for mathematical calculation so many clearly defined conditions, apparently approximating to the principles of elementary forces, which will serve in the same manner as the ellipses of the planets, to arrive, if possible, at the mechanical principle of these actions. The experiments which we are about to describe, have not only the merit of having been conducted with extraordinary skill, but the operator, in proceeding with his researches, has made a most unexpected discovery; and there is every reason to believe, that the means which he employed may be applied to many purposes with advantage.

M. Pasteur confined himself to the study of two classes of crystallizable salts, tartrates and paratartrates. He first considered the general geometric characters of these bodies, when he ascertained that they all, or at least such as he succeeded in forming (nineteen in number), whether single or double neutral salts, or acid salts, might be crystallographically derived from straight prisms, with rectangular bases, perhaps a little oblique sometimes, but always symmetrical. Then taking them individually, he discovered between them a primary character of analogy, and a primary character of dissimilarity, which it is indispensable to specify, as it is his starting point. Prisms, thus formed, present three kinds of angles or edges, which are the mutual intersections of their faces, and which are generally of unequal lengths. Let them be respectively designated by the letters A, B, C, the letters A, B, always representing those rectangular sides of the face which are taken as the base.



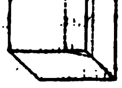
In all the tartrates and paratartrates observed by M. Pasteur, the relation of length between one of these sides, B, for instance, with the non-basic edge C, was found to be nearly always, if not always, the same, whatever might be the nature of the oxide united with the acid, and the quantity of water of crystallization.

This similarity of proportion is shewn in all these bodies by the existence of a secondary face, which is always produced according to the edge A, and the inclination of which to the contiguous faces B, A, C, A, shews the relation of B, to C; for, on measuring this inclination to the basic face B, A, M. Pasteur observed that it varied, within very narrow limits, from a mean of about 130°, its lowest value being 125° 30′ in bitartrate of ammonia, and its greatest 132° 40′ in paratartrate of potash and antimony. This was the first characteristic of analogy, or it might be called identity, which he noticed between all these salts; and this served him afterwards for the purpose of ascertaining, in each of them, by angular admeasurement, or even by simple inspection, the faces which he was to consider as bases, and put in correspondence. With regard to the general character of dissimilarity, or, if it may be so called, of individuality, he deduces from this that the relative length of the basic angle A, which carries the determinative face, varies with the nature of the chemical substances united with the acid, without pretending to assign any law or reason for the same.

Having, by these observations, obtained sufficient indications to enable him to distinguish, in all his prisms, certain faces which he comparatively defines as bases, and others as lateral faces, M. Pasteur set about studying the details of the tartrates. He had previously discovered that all the crystals of this kind of salts may be mathematically derived from a prism with a rectangular, or nearly rectangular base. Now in solid bodies of this configuration there are certain geometrical elements, angles, or edges, which, from their conformation, dimensions, and combination with the adjacent particles, would seem to be cast in the same mould; so that, on looking at them under similar aspects, they appear to have no distinguishing characteristics; whilst others, on the contrary, are evidently dissimilar. If an infinite number of corpuscles, or bodies of scarcely appreciable bulk, identical in form and nature, be supposed to accumulate freely, but slowly, in an infinite homogeneous medium, by virtue of attractive forces acting at short distances, any peculiarity of superposition, which might be applied to one of the elements of the primitive solid, would operate equally on all similar ones, as the determining circumstances would be the same for all. This simultaneousness of similar effects resulting from the similarity of the physical actions exerted by similar parts, has been called by Haüy, *the law of symmetry*. Its effects are, in fact, made incontestably apparent in the generality of the products of crystallization, and would seem to explain the ordinary and regular course of this phenomenon; so that the modifications of form, which are thereby caused in crystals of appreciable dimensions, furnish the most evident, and generally the most certain, indications for discovering its generative type. In many cases, however, this law is departed from in crystallization,—not by presenting, on any of its faces, some isolated peculiarity, which may be attributed to accidental disturbing causes, but offering, on the contrary, an evident result of unsymmetrical causes, which correspond with one another with a regular and constant diversity in the diametrically opposite sides of the crystal. In these cases, if the total system of secondary faces (always in pairs), which would have been required by the law of symmetry upon these same parts, be considered, it will be found that just one-half of this number is alternately wanting, or is replaced by others, dissimilar either in derivation or size to their opposites. Crystallographers have given to this remarkable phenomenon the name of *hemihedry*, and have established all its geometrical conditions; but physical consequences of the highest importance, which it seems to conceal, have not been equally studied. It is with this latter object in view that M. Pasteur has conducted his experiments; and he has found a clue to the discovery.

By studying the secondary facets, which are always more or less completely developed, upon the eight solid angles of the prisms of the tartrates, and comparing their directions, and also their relative dimensions, with the conditions of similarity or dissimilarity which would be assigned to them by the law of symmetry, M. Pasteur has discovered that the crystals of this class of salts are generally hemihedrous,—with this peculiarity, that hemihedry manifests itself by a single set of facets, the others being quite evanescent. Let us, however, take, for example, the general case with crystals of ammoniacal bitartrates, in which the two systems are apparent, their degrees of development being, however, very unequal. If in any one of these crystals, which is supposed to be complete, the four facets of both kinds be ideally prolonged to such an extent as that the similar ones shall intersect each other, two distinct tetrahedrons are obtained, which are not superposable, and the analogous edges of which intersect one another in space; being always correlative, only one of the two need be defined. M. Pasteur chooses that one, the directing facets of which always exist, and are constantly more developed in each crystal when the other is apparent; and he gives them the special name of *tetrahedric facets.*

Being aware that the molecular elements of all the tartrates generally give the polarized rays of light one and the same direction, which direction may be defined by saying it is to the right of the spectator, M. Pasteur has thought fit to define the situation of his tetrahedric facets, relatively to the mass of the crystal, by a similar description; as, by a very probable conclusion, he was led to consider them as necessarily co-existent with molecular constitution, if not as a cause at least as an effect. The rule which he gives for shewing their connection with rotatory phenomena is as follows:—



First, recognize the rectangular base A, B, either by practice, or, if requisite, by measuring its inclination to the secondary face, which can always be found, and which determines the almost invariable relation existing between the angles B, C, in all these crystals. This being done, place the edge A, in a vertical position, and turn the base A, B, towards you, the edge B, will then be horizontal; look at the crystal in a vertical direction, and you will occasionally perceive one and even two facets parallel thereto;

these are not tetrahedric; but their parallelism with the edge B will cause these latter to be recognized on the angles of the base, both to the right and left. They may, however, occasionally appear separated from its visible surface, by the extension of secondary faces, parallel to the edges A, or B. If the two systems of hemihedric facets be realized, so that their dissymmetry is only manifested by the constant inequality of their development, as is shewn by M. Pasteur, in relation to bitartrate of ammonia, you will perceive two at the angles nearest the eye, one to the right and the other to the left,—the largest being to the right. If one of the systems disappears, and the other remains, as in all the neutral tartrates, the facet belonging to this latter system still appears nearest the eye, and to the right hand, as before. It is, therefore, always this facet, characterized by its position to the right, which M. Pasteur specially denominates—tetrahedric; and, with a little practice, it may be recognized in less time than has been taken to describe it. When you have seen it, turn the crystal back vertically, and you will see a precisely similar facet to the right.

In this manner, a solution of tartrate will always present its deviation in the same direction when the tube, in which it is placed for inspection, is turned round. In this case, M. Pasteur says, that hemihedry takes place to the right. He would have stated it to have taken place towards the left, if, on examining it under the same conditions, the tetrahedric facet had been presented to the left of the spectator. This is, however, never the case with the tartrates.

Having established this characteristic, and verified its permanency, M. Pasteur has, under the same crystallographic point of view, studied the neutral paratartrates of potash and ammonia, and of these two bases united; he did not discover therein any signs of hemihedry; neither the solutions of these salts, nor of paratartaric acid, left any trace of rotary molecular power. He then directed his attention to the double paratartrate of soda and ammonia, which has been noticed by M. Mitscherlich as particularly remarkable for the complete identity of all the properties of its mass with those of the corresponding tartrate; having the same crystalline form, and the same angles, the same specific gravity, the same double refraction, optical axes similarly situated, and an equal amount of simple refraction, in a state of solution,—offering, in a word, this sole, but important feature of dissimilarity in the constitution of its molecular elements, viz., that it has not the rotary power possessed by the tartrate. This characteristic is, in fact, not perceptible in the solutions of this paratartrate when they are formed by a combination of all the crystals obtained in the same preparation. But on examining these crystals individually, when they separate from an aqueous solution, which was at first not saturated, but afterwards submitted to a slow evaporation, M. Pasteur has found, not only in some, but in all, manifest traces of hemihedry, exactly of the same kind as those which he had discovered in the tartrates, bearing upon the analogous parts, and making itself apparent in the same manner; with this difference, however (which is without precedent in the operation of crystallization, otherwise so identical), that in some the hemihedry takes place to the right, as with the tartrates; whilst in others, similar to the preceding ones in respect of number, size, and bulk, it is to the left; and what makes this phenomenon more curious is, that the crystals of each kind possess a molecular rotatory power, in the same direction as their hemihedry. M. Pasteur first demonstrated this fact with crystals, which he had previously prepared, but of which he made known to us the proper hemihedric characteristics. He afterwards repeated the experiment before us with equal success, making use of crystals formed before us with paratartaric acid, of the complete optical neutrality of which we had previously assured ourselves. Having taken two exactly equal weights of this acid, he first saturated one with soda, until the mixed solution became neutral to the colored re-agents; he then added the other portion of acid, and completed the saturation by ammonia, until neutrality was restored. The constituent parts of the double salt were thus brought in contact in a perfectly homogeneous state of solution, care having been taken to employ sufficient water to prevent all fear of immediate precipitation. The liquid obtained was poured into a circular glass crystallizer, and left to evaporate slowly, protected from any agitation, and from artificial change of temperature. After the expiration of two days crystals began to be formed, at first of very small size, separate from one another, and perfectly limpid; they afterwards progressively increased in size and number; and when they appeared sufficient in quantity to furnish solutions, having perceptible rotary power, M. Pasteur took out the finest, one by one, dried them on paper, so as not to injure their shape, and then distinguished them by their opposite hemihedric characters. By means of this characteristic he separated them into two groups, of which he pointed out beforehand the respective directions of rotation and hemihedry; which was afterwards fully confirmed by experience. These two kinds of crystals, as M. Pasteur has affirmed, only differ in their form from the position of their tetrahedric facets, which, being extended over one another, produce two tetrahedrons, geometrically symmetrical; so that, as he truly described them, those on the right look like those on the left seen in a mirror. Having made one collection, the evaporation was continued, when crystals of two kinds were simultaneously deposited; and during the whole of the operation, that portion of the solution which remained in a liquid but saturated state was optically neutral to polarized light. The formation of crystals of opposite rotation, is therefore carried on in such manner, that, in all the phases of their solidification and development, their rotating powers would cease, by opposition, if they were united in one liquid solution. M. Pasteur had most positively verified this persistance of the optical neutrality of the mixed liquid, by means of M. Soleil's double rotating-plates. We have also verified the correctness of his observation by the same process.

We have described in detail all this remarkable experiment, in order to shew the relation or perfect identity of the physical circumstances under which the two species of crystals separate simultaneously from the same medium. We will revert again to the conclusions to be drawn therefrom, after having stated the additional experiments made by M. Pasteur.

He took, separately, the solution of paratartrate which we will call L, it having a rotation to the left, and also the solution which we will call R, from its direction of rotation being to the right; these having been gently heated, he gradually poured therein small quantities of a solution of soda, by which means the ammonia was disengaged, neutrality, as regarded the re-active papers, being still maintained. The two double salts, therefore, become approximatively simple salts of soda; the solutions of which, on being observed after this change, shewed rotatory power of the same direction and nature as before. The absolute intensity of these powers was scarcely modified, as the solutions were respectively brought back to a quantity differing but little from their previous amount.

This maintenance of the direct and contrary rotatory powers, after the change of base, gave abundant proof of the presence of two acids, molecularly distinct. It only remained to extract them; this M. Pasteur effected, by precipitating them by a salt of baryta, and afterwards separating them therefrom by sulphuric acid. He also tested their action upon polarized light, and found it to be such as he expected. The paratartrate L, furnished an acid deviating to the left, and the paratartrate R, one deviating to the right, each according to the direction of the hemihedry, which he had so skilfully distinguished in their crystals. The extremely small quantities of each of these acids, which he has, up to the present time, succeeded in obtaining, have not allowed of his studying them perfectly. He supposes also, and not without apparent reason, that the energy of their rotatory power might be partially diminished and concealed by the presence of sulphuric acid, from which he had not entirely succeeded in separating them,—for he produced similar effects upon tartaric acid. But the little he obtained, on being tested with M. Soleil's double rotation-plates, sufficed to shew the proper direction of each rotation, which is its principal distinguishing feature; and the proofs which he shewed us enable us to state the certainty of this fact.

We will now revert to the fundamental experiment of M. Pasteur, —to that one in which primitive paratartaric acid, which was at first ascertained to be optically inactive on being dissolved in water, and neutralized by equivalent doses of ammonia and soda, deposits, under the influence only of spontaneous, slow, and still evaporation, two kinds of crystalline products, apparently equal in quantity, but invariably different in the direction of the hemihedry of their form, exercising upon polarized light a molecular action of contrary directions, not manifested at all by the primitive acid; and from which acids may also be obtained, exercising the same power, with the same feature of opposition. Do these latter arise from a chemical decomposition, which takes place between the elements of the inactive acid? or were they preexistant and crystallized together, presenting the appearance of a single and definite body? On considering the complete identity of the physical circumstances in which the particles of the mixed liquid furnishing the two systems of crystals are placed,—the absence of all external force, either chemical or physical, which may produce an unequal effect upon them,—and, lastly, the constant continuity with which the double deposit takes place from the beginning to the end, the idea of true molecular decomposition does not seem probable. Simple separation, on the contrary, offers merely a fact, new, unexpected, and important, from the analogous results to which it may lead; but there is nothing therein repugnant to the notions which we may have concerning molecular construction. A more intimate study of the two new acids will, however, settle the question, for the proper solution of which, M. Pasteur only required to obtain them in sufficient quantity.

Results of great importance in the development of their relation with tartaric acid (that hitherto mysterious body) will also, doubtless, be discovered. Even at present, with prudent reserve, M. Pasteur makes known the singular analogy which it seems to bear to the paratartaric acid R. The double salt which this forms with soda and ammonia furnishes crystals so similar to those of the neutral tartrate of the same bases, that it is impossible to distinguish them therefrom. These two combinations possess a rotatory power in the same direction, and so nearly equal in force, that the difference is scarcely perceptible, with the present opportunities of comparing them: this fact had been announced to us by M. Pasteur, and we verified it by an experiment made with solutions of the two salts of equal degrees of saturation. It only differed from the direct experiment made by M. Pasteur, inasmuch as we employed the crystals furnished by the acid L, which gave an opportunity of ascertaining whether equal volumes of them were optically equal. Their rotatory power was found to be relatively to that of the tartrate as 25 to 29. Now, a difference in this direction, and of this nature, was inevitable on the supposition of equality; and it is a matter of surprise that it is not more considerable, on considering the circumstances under which the crystals of each kind are obtained. In fact, as M. Pasteur judiciously remarks, they are not deposited separately and isolated from each other. Their isomorphism is, on the contrary, so perfect that they combine with the greatest facility, and can only be distinguished by their peculiar hemihedric characteristics, by separating them, one by one, from the groups; some of both sorts being invariably found in all the groups. It will be readily understood that this method of distinguishing them is not always strictly correct. The crystals of opposite directions, when detached from each other, must, of necessity, often sustain some loss on being broken asunder, and their presence neutralizes, optically, an equal mass of the crystal of an opposite nature, which they have penetrated. The slight difference which is perceptible in the rotatory powers of these crystals and those of the tartrates after such selection, as well as the direction of that difference, therefore render the equality of these powers probable. This will, however, be decided when M. Pasteur has obtained his two acids in a state of purity, and in sufficient quantity to observe them separately. For if the acid B, is tartaric acid itself, the singular character of dispersion presented by this latter in its rotatory action, in contradistinction to all other bodies, should be apparent.

Hitherto this acid was the only one in which rotatory properties were known to exist. M. Pasteur's discovery now gives us at least one more, if not two. This characteristic, which allows of their being recognised, either alone or in combination, in liquid solutions, will, no doubt, give rise to very important experiments in mechanical chemistry. But the very skilful use which M. Pasteur has made of these crystallographic indications, particularly hemihedry, may induce him to enlarge upon the subject. It is not at all probable that tartaric acid, and its two congenerous acids, are exclusively endowed with the rotatory power. Citric, malic, and some other organic and fixed acids, perhaps, only appear to be without that power, because they have been observed as they were found; and the same method might lead M. Pasteur to shew they possess it, by analyzing them. We call his early but not exclusive attention to these acids, as presenting the greatest chance of success; for amongst the great number of substances or combinations, in which the existence of the molecular rotatory power has been demonstrated, not a single one has been found which did not contain at least one organic principle; and if this be not a sufficient reason to lead to the belief that the molecular rotatory power appertains exclusively to these principles, it is at least a plausible reason for endeavouring first to discover it therein.—[*Comptes Rendus.*]

New instrument for ascertaining the relative quantities of two liquids when mixed together, and particularly mixtures of alcohol and water, by the dilatation of those liquids.—Presented to to the Academy of Sciences, Paris, by M. J. T. SILBERMANN.

VARIOUS means have been suggested and employed for ascertaining the respective quantities of alcohol and water in mixtures of those liquids; but these are all found to possess many disadvantages. I have the honor to propose to the Academy a method which has not hitherto been employed for this purpose, by which the evils attendant upon the other plans are obviated.

The processes hitherto known are founded either upon the distillation, density, or boiling point, of the alcoholic liquid. Now, mine is based upon the *dilatation* of the alcoholic liquid. It is well known that between zero and 100° of temperature the dilatation of alcohol is triple that of water. This dilatation is still greater between 25 and 50° of temperature, and may be thus demonstrated:—Pour water, at 25°, into a thermometer, so as to fill the reservoir, and a small portion of the pipe up to a certain mark; then, on heating the thermometer to 50°, the water will rise a certain distance above the mark; and let this rise be marked on the tube. Now, if the same quantity of pure alcohol, also at 25°, be substituted for the water, and heated to the same temperature (viz. 50°), it will be found to have risen 3½ times higher than the water. Any mixture of alcohol and water, on being treated in the same way, will be found to have a mean point of dilatation between these two, and will be nearer the one or the other, according as either liquid preponderates in the mixture. If, therefore, a series of mixtures of alcohol and water be made, beginning with water 100 parts, alcohol 0; water 99, alcohol 1; water 98, alcohol 2; water 97, alcohol 3, &c., up to water 0, alcohol 100; and their several points of elevation, at the respective temperatures of 25° and 50°, be carefully marked on the tube, a complete centesimal alcoholmetric scale will be produced, which will indicate the quantity of alcohol contained in any mixture of alcohol and water, by introducing it at 25°, and afterwards heating it up to 50°.

The same process may be employed with any other two liquids having points of dilatation differing from those of alcohol and water; but it will be understood, that the same scale will not serve for more than one mixture. In order to adapt this principle to the ordinary purposes of alcoholmetric measurement, I have constructed a thermometer in a peculiar manner,—thereby forming an instrument which I call a *dilatometer.* The form and arrangement of this apparatus are as follows:—To a metallic plate are fixed two thermometers, one of mercury, shewing the initial and final temperatures (say 25° and 50°), and the other, for containing the liquid to be tested, is open at top and bottom, tapered at the lower end beneath the reservoir and terminating above in a large tube; it is, in fact, a species of funnel.

As the alcoholmetric scale is above the point where water stopped at 50°, the portion intended for the dilatation of pure water may be substituted by a space of equal capacity, *i. e.*, shorter but wider, consisting of an enlargement in the interior at that part. The tube is thus shortened, and the number of its divisions for other purposes may be increased. The thermometer for holding the liquid is closed at its tapered point below by a small valve of cork, suitably fixed on a spring, which is fastened to the supporting plate.

In order to cause the liquid under examination to flow, the spring-valve is depressed by means of a copper rod, attached to the supporting plate by a clamp-piece (in a position to act upon the spring), and to the top or funnel-shaped part of the thermometer by a nut, fitting on the upper part of the rod. In order to obtain a quick motion, the screw has four threads: to open or close the thermometer, it is only necessary to turn the head of this rod in either one direction or the other. As the liquids are often impregnated with air or gas, it is found necessary, before testing the liquids, to drive off the gas or air; the best method of effecting this is by means of a vacuum, which may be produced by the use of a small leather piston, working in the tube of the thermometer. This piston serves first, by suction, to fill the thermometer from below; and then, the lower part being closed and the piston driven down, on raising it the air will be seen to separate from the liquid at all points; and, after two or three more strokes of the piston, the liquid may be completely purified, so that no more bubbles will rise during the operation, have a tendency to disturb the column. To effect this withdrawal of the piston without any shock, so as not to separate the column abruptly, the piston-rod is made hollow throughout; the operator, having wetted his finger, applies it to the top of the piston-rod, in order to create a vacuum as he draws up the piston; he then removes it to re-admit the air, and the piston is thus removed without a shock. In order to form the vacuum properly, the liquid must be pumped in until it rises through the piston-rod on depressing the piston; on seeing this, the operator may be sure that, on raising the piston, there is no air left underneath it. The tube is now full of liquid, and by depressing the spring-valve the liquid is run off, until it is only as high as the lowest mark on the tube, when the temperature has been for two or three minutes at the lowest degree of the mercury thermometer.

I propose this new method, as the old processes possess certain inconveniences, which I will briefly point out.

Distillation.—This process is but very rarely employed, as it is a very long operation, and requires great skill. Its adaptation is owing to the ingenious methods of M. Gay-Lussac, which had simply for their object the discovery of the truth, without regard to the time required for arriving at a conclusion.

Density.—The errors in this process result from the mixture with the liquid of salts or syrups, the specific gravity of which, being greater than that of alcohol, prevents its true quality from being ascertained, and permits dilutions to be made; thereby facilitating the evasion of the excise duties, and the robbery of the purchaser. Wines, for the same reasons, only indicate about one-half their quality. For this reason, M. Gay-Lussac, in that case, combines his distilling process with his alcoholmetric areometer.

Boiling point.—Of all the known processes conducted on this principle, M. Tabarié has incontestably introduced the best; but experienced persons are aware of the difficulties to be met with in determining this point; they know that steam or vapour may be heated beyond its point of generation, and that the thermometer, even when immersed in the liquid, may, under certain circumstances, stand several degrees above the real temperature, which will give an error of four alcoholmetric degrees for every extra degree of temperature. Besides this, it is necessary to take the barometric variations into account in some better way than has been hitherto done.

The process which I propose, and which is based upon the principle of dilatation, may be applied to test wines as well as alcoholized liquids of any strength; for the salts and vegetable substances, in solution, which enter into their composition in combination with water and alcohol, do not materially affect the result, as all solutions expand in the same degree as water within the range of temperature which I have chosen. There is no occasion to fear the presence of any liquid more dilatable than alcohol, as liquids of such a nature are more expensive, and may, besides, be detected by their peculiar smell or taste. The same reasoning is also applicable to liquids less dilatable than water. I have chosen 25° as the initial temperature, because water is always found to be below that temperature, even in summer.

With regard to the final temperature of 50°, I have chosen that temperature to avoid the effect of evaporation, which might diminish the actual degree, if it approached too near the boiling point; and, as respects the range between this and 25°, I have found it sufficient. Besides, these two temperatures offer great facilities for the experiment, as, if it be conducted in a vessel capable of containing about a quart of water, a small spirit lamp underneath will be sufficient to maintain either of these temperatures. The plate, carrying the thermometers, serves to agitate the water, in order that its temperature may be uniform throughout.—[*Ibid.*]

REPORT OF AMERICAN PATENTS.

From the "Journal of the Franklin Institute."

BY MR. C. M. KELLER.

To MATTHEW STEWART, *of the city of Philadelphia, Pennsylvania, for an improvement in cast iron plates for covering buildings.*

THE nature of this invention is set forth in the following claims, which consists firstly, in forming the rectangular plates with rebated edges on opposite sides, flat on the upper side, or surface, and concave on the under surface, having two of the corners of each plate cut off parallel, causing the plates to combine, and unite, and form close joints, having broad bearings to rest on the sheathing, or laths, and a perforated protuberance, or knob, and a countersink in the same, to admit the shank and head of a screw back of the point of junction of the cut-off corners of the plates, so that when a plate is required to be removed, it becomes only necessary to withdraw the screw, and slide the plate back from beneath the contiguous plates, and it becomes separated therefrom as before described. The patentee likewise claims the manner of constructing the triangular shaped plates, having the long sides turned down nearly at right angles to the face of the plate, and notched, and ribbed for the facility of interlocking their ends and securing them together against the gutter; the short sides being rebated in a similar manner to the above named rectangular plates, in order to be fitted under the same, and be combined therewith, as described and represented. And also, constructing the ridge cap, like an angular roof, with a vertical plate projecting down from the apex, and perforated to admit bolts or screws, by which it is secured to the ridge pole—the sloped sides being made sufficiently wide to extend over the adjoining plates on either side of the ridge, as above described and represented.

To AUGUSTUS A. SEVERENCE, *of Cherry Valley, in the county of Ashtabula, Ohio, for an improvement in cheese shelves.*

The patentee says,—"The nature of my invention consists in providing shelves, which revolve upon an axle, and turn upon pivots or gudgeons, whereby either side of the cheese may be exposed by the dairyman to the air and operation of curing."

He claims the combination of shelves with the revolving frame, substantially in the manner and for the purpose set forth.

LIST OF REGISTRATIONS EFFECTED UNDER THE ACT FOR PROTECTING NEW AND ORIGINAL DESIGNS FOR ARTICLES OF UTILITY.

1848.

Oct. 31. *W. Burbury*, of Clarence Villa, Leamington, for a safety carriage, to prevent horses from falling.

31. *Richard Ede Marshall*, of Clarence-street, Cheltenham, for an improved clip and file for holding letters, papers, and pamphlets.

Nov. 2. *William Reid*, of 51, Conduit-street, Regent-street, hosier and draper, for the "sans-pli shirt" without gathers.

Nov. 2. *Spilsbury, Butler, & Co.*, of 38, Friday Bridge, Birmingham, for cooking, roasting, and baking apparatus.

3. *William Ramsey*, of 14, Silver-street, Kingston-upon-Hull, saddle and harness-maker, for an elastic seat for a saddle.

3. *Thomas Edwards*, of 4, Charing-cross, London, army clothier, for a military folding dressing-glass.

3. *Thomas Edwards*, of 4, Charing-cross, London, army clothier, for a camp and cabin shaving-glass.

4. *David Harvey*, of 16, York-place, Pentonville-hill, and the Admiralty, Somerset-house, London, for a safety disconnecting plate for locomotive or any other railway carriages.

4. *John Inderwick*, of 58, Princes-street, Leicester-square, Middlesex, for the " Egyptian treble cylinder pipe."

7. *William Tanner*, of 83, Upper-street, Islington, watch and clock-maker, for a dial-plate for time-keepers.

7. *Willis & Co.*, of 18, St. James-street, London, for the " Australian mantle."

7. *Christopher Hill*, of New Swindon, Wiltshire, for an improved covering for waggons.

7. *Robert Allason*, of Sunderland, auctioneer, for a sifting shovel.

7. *Humphreys & Thirst*, of Halsey-street, Chelsea, builders and contractors, for a flap valve for sewers.

7. *Thomas John Begent*, of 8, York-street, St. James', for an improved spring clothes-peg.

7. *John Storrie*, of 9, Union-road, Clapham-road, for Storrie's knife-board.

8. *Henry Moise*, of Holborn, London, Middlesex, for a file or holder for newspapers.

8. *John Roberts*, of 34, Eastcheap, City of London, spice merchant, for an improved flower supporter.

8. *George Carter Haseler*, of Birmingham, for a brooch fastening.

13. *Thomas Taylor*, of 3, Corporation-street, Manchester, for the scarf wrapper vest.

13. *Benjamin Nicoll*, of 42, Regent-circus, Piccadilly, London, for a shirt.

14. *William Evans*, of Market-place, Banbury, Ironmonger, &c., for an improved mangle.

15. *Henry John Nicoll & Donald Nicoll*, of Regent-street, and Cornhill, London, for a wrapper coat, and feet protector.

17. *William Broughton*, of South-street, Finsbury Market, stove and grate manufacturer, for the "universal stove."

Nov. 17. *Henry Austin*, of Gwydyr House, Westminster, civil engineer, for a drain pipe with single half-socket joint.

20. *George Perrott*, of the Hive Iron Works, City of Cork, Ireland, for an improved shape and design of a portable capstan, or machine by which manual power may be made available for various useful purposes.

20. *James Lyne Hancock*, of Goswell-mews, Goswell-road, London, for a self-acting hose pipe reel.

22. *Cobett Whitton*, of Sixhall Heath, Stafford, for Remington and Whitton's improved farmers' and graziers' portable mill.

22. *William Kirkwood*, of West Thistle-street-lane, Edinburgh, for an improved water-closet.

22. *Bryden & Sons*, of No. 8, Rose-street, Edinburgh, bell-hangers, &c., for a safety receiving-box for letters and parcels.

23. *Charles Rowley*, of 23 & 24, Newhall-street, Birmingham, stamper, piercer, and button manufacturer, for an improved ticket-holder.

23. *John Ferrabee & Sons*, of the Phœnix Iron Works, near Stroud, Gloucestershire, for an improved knife with guard for cutting vegetable and other substances.

23. *Joseph Ashforth & Co.*, of Bruce Works, Bridge-street, Sheffield, for a ratchet wrench or spanner.

23. *William Tortoise*, of 121, St. John-street, Clerkenwell, for an improved paper cutting-slide.

24. *Thomas Evans*, of 24, Southampton-street, Strand, for an expanding shirt collar.

24. *Henry Browne*, of 14, Prior-place, East-lane, Walworth, for a bath cock.

24. *Frederick Allen*, of Birmingham, for a brooch fastening.

24. *Jarrold & Sons*, of 47, St. Paul's Churchyard, London, and London-street, Norwich, booksellers, for the juvenile artists' drawing table.

25. *John Gilby*, of Chelmsford, in the county of Essex, saddler, for reins for driving or riding.

25. *The Bromsgrove Railway Carriage Company*, Bromsgrove, for a pipe and fastening.

27. *Haldane & Rae*, of Edinburgh, brass-founders, for a tap or cock for drawing off liquids.

27. *John Petrie*, of Yorkshire-street, Rochdale, for a wringing and mangling machine.

27. *J. & W. Robertson*, of Ardrossan, for the "pentagraphic delineator."

List of Patents

That have passed the Great Seal of IRELAND, from the 17*th October to the* 17*th November,* 1848, *inclusive.*

To William Sager, of Rochdale, in the county of Lancaster, wool dealer, for certain improved means and apparatus for effecting the transit or conveyance of goods, passengers, and correspondence, by land or water, and for other such purposes; part or parts of which means and apparatus constitute a new and improved method of generating steam,—which improvement is applicable to other purposes to which steam is generally applied as a motive power.—Sealed 28th October.

John Miller, of Henrietta-street, Covent-garden, in the county of Middlesex, Gent., for a new system of accelerated menattrite locomotion, even by animal impulsion, for every species of transport machines acting by means of wheels, whether on land or water,—being a communication.—Sealed 28th October.

Henry Highton, of Rugby, in the county of Warwick, clerk, master of arts, and Edward Highton, of Regent's-park, in the county of Middlesex, civil engineer, for improvements in electric telegraphs.—Sealed 8th November.

Peter Fairbairn, of Leeds, in the county of York, machine maker, for improvements in machinery for heckling, carding, drawing, roving, and spinning flax, hemp, tow, silk, and other fibrous substances.—Sealed 11th November.

List of Patents

Granted for SCOTLAND, subsequent to October 22*nd,* 1848.

To John James Cole, of Lucas-street, London, engineer, for certain improvements in steam-engines.—Sealed 25th October.

Harry Joseph Perlbach, of Hamburg, founder, for an improved method or methods of uniting certain metals and alloys of metals.—Sealed 25th October.

Peter Fairbairn, of Leeds, machine maker, for improvements in machinery for heckling, carding, drawing, roving, and spinning flax, hemp, tow, silk, and other fibrous substances.—Sealed 30th October.

Joseph Eugene Asaert, of Lille, France, for improved means of obtaining motive power.—Sealed 30th October.

Isaiah Davies, of Birmingham, engineer, for improvements in steam-engines and locomotive carriages,—parts of which are also applicable to other motive machinery.—Sealed 31st October.

Thomas John Knowlys, of Heysham Tower, near Lancaster, and William Fillis, of Shirley, in the county of Hants, mechanician, for improvements in generating, indicating, and applying heat.—Sealed 6th November.

Henry Bessemer, of St. Pancras-road, London, engineer, for improvements in the manufacture of gas.—Sealed 6th November.

Charles Green, of Birmingham, patent brass tube manufacturer, and James Newman, of Birmingham, manufacturer, for improvements in the manufacture of a part or parts of railway wheels.—Sealed 14th November.

Thomas John Knowlys, of Heysham Tower, near Lancaster, for improvements in the application, renewal, and compression of atmospheric air.—Sealed 14th November.

Thomas and John Edgecumbe Gill, of Plymouth, manufacturers, for improvements in the manufacture of manures.—Sealed 15th November.

Alfred Vincent Newton, of the Office for Patents, 66, Chancery-lane, London, mechanical draughtsman, for certain improvements in the manufacture of steel,—being a foreign communication.—Sealed 20th November.

George Remington, of Warkworth, in the county of Northumberland, civil engineer, for improvements in locomotive engines, and in marine and stationary engines.—Sealed 20th November.

New Patents
SEALED IN ENGLAND.
1848.

To Meyer Jacobs, of Spitalfields, Gent., for certain improvements in the manufacture, stamping, and treatment generally of woven fabrics of all kinds. Sealed 2nd November—6 months for inrolment.

Robert Walter Winfield, of Birmingham, merchant, for certain improvements in the construction and manufacture of metallic bedsteads, couches, and sofas. Sealed 2nd November—6 months for inrolment.

William Bullock Tibbits, of Bramston, Northamptonshire, Gent., for improvements in obtaining, applying, and controlling motive power; parts of which improvements are applicable to the raising and forcing of liquids. Sealed 2nd November—6 months for inrolment.

Richard Archibald Brooman, of Fleet-street, London, Gent., for certain improvements in the manufacture of hinges, and the machinery or apparatus used therein,—being a communication. Sealed 2nd November—6 months for inrolment.

Richard Bright, of Bruton-street, lamp-manufacturer, for improvements in lamps, wicks, and covers for vessels for holding oil and other fluids. Sealed 2nd November—6 months for inrolment.

John Harris, of Richard's-terrace, Albion-street, Rotherhithe, engineer, for a mode or modes of founding type, and of casting in metal, plaster, and certain other materials. Sealed 2nd November—6 months for inrolment.

Charles Dawson, of Hardinge-street, Islington, professor of music, for certain improvements in musical instruments, and in apparatus to be used in connection with musical instruments. Sealed 2nd November—6 months for inrolment.

James Robertson, of Liverpool, in the county of Lancaster, cooper, for a mode or modes of consuming smoke and other gaseous products arising from fuel and other substances. Sealed 2nd November—6 months for inrolment.

Charles William Kesselmeyer, of Manchester, warehouseman, and Thomas Mellodew, of Oldham, manufacturer, for certain improvements in the manufacture of velvets, velveteens, and other similar fabrics. Sealed 2nd November—6 months for inrolment.

Alfred Vincent Newton, of the Office for Patents, 66, Chancery-lane, mechanical draughtsman, for certain improvements in the manufacture of steel,—being a communication. Sealed 2nd November—6 months for inrolment.

James Hart, of Bermondsey-square, engineer, for improvements in machinery for manufacturing bricks and tiles; parts of which machinery are applicable to moulding other substances. Sealed 2nd November—6 months for inrolment.

George Arthur Biddell, of Ipswich, engineer, for improvements applicable to gas-burners. Sealed 2nd November—6 months for inrolment.

Thomas John Knowlys, of Heysham Tower, near Lancaster, Esq., for improvements in the application, removal, and compression of atmospheric air. Sealed 2nd November—6 months for inrolment.

Francis Gybbon Spilsbury, of St. John's Wood, Middlesex, Gent., for improvements in paints and pigments. Sealed 2nd November—6 months for inrolment.

William Weild, of Manchester, mechanical draftsman, for certain improvements in machinery for spinning cotton and other fibrous substances. Sealed 2nd November—6 months for inrolment.

Robert Thomson Pattison, of the city of Glasgow, printer, for an improved preparation or material for fixing paint or pigment colors on cotton, linen, woollen, silk, and other woven fabrics. Sealed 2nd November—6 months for inrolment.

George Henry Bachhoffner, of the Royal Polytechnic Institution, London, Doctor of Philosophy and Professor of Natural Philosophy, for improved means of transmitting, communicating, or conveying intelligence. Sealed 4th November—6 months for inrolment.

Joseph Cooper, of Walworth, tailor, for improvements in fastenings for wearing apparel. Sealed 4th November—6 months for inrolment.

Charles Iles, of Birmingham, machinist, for improvements in the manufacture of certain descriptions of dress-fastenings, and in the making up of dress-fastenings and other articles for sale. Sealed 4th November—6 months for inrolment.

William Henry Kempton, of Pentonville, Middlesex, Gent., for improvements in reflectors and apparatus for artificial light. Sealed 7th November—6 months for inrolment.

Moses Poole, of the Bill Office, London, Gent., for improvements in machinery for making nails,—being a communication. Sealed 7th November—6 months for inrolment.

James Napier, of Swansea, operative chemist, for improvements in the manufacture of copper and other metals, and alloys of metals. Sealed 9th November—6 months for inrolment.

Richard Coad, of Kennington, in the county of Surrey, chemist, for improvements in the construction of blast and other furnaces and fire-places. Sealed 9th November—6 months for inrolment.

James Anderson, of Abbotsford-place, Glasgow, N. B., starch-manufacturer, for a certain improved mode of separating the different qualities of potatoes and other vegetables. Sealed 11th November—6 months for inrolment.

Alexander Parkes and Henry Parkes, of Birmingham, for improvements in the manufacture of metals and alloys of metals, and in the treatment of metallic matters with various substances. Sealed 11th November—6 months for inrolment.

John Browne, of Osnaburgh-street, Gent., for improvements in fire-escapes, and in apparatus to facilitate persons employed in cleaning windows. Sealed 11th November—6 months for inrolment.

Alexander Balfour, of Dundee, Scotland, leather-merchant and manufacturer, for improvements in apparatus for cutting metal washers and other articles, and in the construction of buffers. Sealed 16th November—6 months for inrolment.

Samuel Adams, of West Bromwich, Staffordshire, organist, for improvements in mills for grinding. Sealed 16th November—6 months for inrolment.

William Wilkinson, of Jarrow, near Gateshead, Durham, coke-manufacturer, for certain improvements in the construction of coke-ovens, and in the machinery or apparatus to be connected therewith. Sealed 16th November—6 months for inrolment.

Thomas Cullen, of London, Gent., for improvements in apparatus for steering ships and other vessels. Sealed 18th November—6 months for inrolment.

Thomas Masters, of Regent-street, Middlesex, for certain improvements in apparatus for making aerated waters, and in apparatus for charging bottles and other vessels with gaseous fluid; also improvements in bottles and other vessels—in apparatus for drawing off liquids—in securing corks or stoppers in bottles or other vessels—and in taps and vent pegs. Sealed 18th November—6 months for inrolment.

John Juckes, of Rosamond Cottage, Fulham, Gent., for improvements in furnaces and fire-places. Sealed 18th November—6 months for inrolment.

Alexander Mc Dougal, of Longsight, Manchester, chemist, and Henry Rawson, of Manchester, agent, for improvements in the manufacture of sulphuric acid, nitric acid, oxalic acid, chlorine, and sulphur. Sealed 21st November—6 months for inrolment.

John Oliver York, of 24, Rue de la Madeleine, Paris, engineer, for improvements in the manufacture of metallic tubes. Sealed 21st November—6 months for inrolment.

William Hood Clement, of the City of Philadelphia, in the United States of America, Gent., for certain improvements in the manufacture of sugar; part of which improvements is applicable to evaporation generally; also improved apparatus for preparing the cane-trash to be used as a fuel. Sealed 21st November—6 months for inrolment.

Henry Newson, of Smethwick, near Birmingham, for an improvement or improvements in trusses. Sealed 23rd November—6 months for inrolment.

Hugh Bell, of London, Esq., for certain improvements in aerial machines, and machinery in connection with the buoyant power produced by gaseous matter. Sealed 23rd November—4 months for inrolment.

Christian Schiele, of Manchester, mechanician, for certain improvements in the construction of cocks or valves, which improvements are also applicable for reducing the friction of axles, journals, bearings, or other rubbing surfaces, in machinery in general. Sealed 23rd November—6 months for inrolment.

Peter Llewellin, of Bristol, brass and copper manufacturer, and John Hemmons, of the same place, brass founder, for improvements in the manufacture of cocks or valves for drawing off liquids. Sealed 23rd November—6 months for inrolment.

Henry Archer, of Great George-street, Westminster, Gent., for improvements in facilitating the division of sheets or pieces of paper, parchment, or other similar substances. Sealed 23rd November—6 months for inrolment.

Frederick Bramwell, of Milwall, Poplar, engineer, and Samuel Collet Homersham, of the Adelphi, Gent., for improvements in feeding furnaces with fuel. Sealed 23rd November—6 months for inrolment.

Pierre Armand le Comte de Fontainemoreau, of Skinner's-place, Sise-lane, in the City of London, for certain improvements in the process of, and apparatus for, treating fatty bodies; and in the application of the products thereof to various useful purposes,—being a communication. Sealed 25th November, 6 months for inrolment.

John Goucher, of Woodsetts, in the West Riding of the County of York, agricultural machine and implement maker, for a machine for threshing corn and other grain. Sealed 25th November—6 months for inrolment.

CELESTIAL PHENOMENA for December, 1848.

D.	H.	M.	
1			Clock after the ☉ 10m. 36s.
—			☽ rises 11h. 29m. M.
—			☽ passes mer. 4h. 20m. A.
—			☽ sets 9h. 17m. A.
2	21	53	♄ in conj. with the ☽ diff. of dec. 2. 13. S.
3			Occul. λ Aquarii im. 3h. 22m. em. 4h. 10m.
3	8	6	☽ in □ or first quarter
—			Occul. 78 Aquarii, im. 4h. 33m. em. 5h. 50m.
5			Clock after the ☉ 8m. 59s.
—			☽ rises 1h. 23m. A.
—			☽ passes mer. 7h. 37m. A.
—			☽ sets 0h. 47m. M.
	11	57	♃'s third sat. will em.
	22	26	♅ in conj. with the ☽ diff. of dec. 2. 5. N.
6	3	43	♂ in the descending node
7			Occul. 85 Ceti, im. 10h. 9m. em. 10h. 51m.
7	11	35	☿ in conj. with ♂ diff. of dec. 1. 15. N.
	11	50	♃'s second sat. will. im.
	16	29	♃'s first sat. will im.
8	9	11	♃ stationary
	19		☿ in conj. with Pallas
9	6		☽ in Perigee
9	10	57	♃'s first sat. will im.
9	15	5	☿ in conj. with Ceres
—			Occul. A.S.C. 516, im. 3h. 32m. em. 4h. 1m.
—			Occul. 85 Tauri, im. 5h. 47m.
10			Clock after the ☉ 6m. 47s.
—			☽ rises 4h. 32m. A.
—			☽ passes mer. Morn.
—			☽ sets 7h. 15m. M.
—			Juno greatest hel. lat. S.
—			Occul. *N* Tauri, im. 8h. 21m. em. 9h. 20m.
	3	13	☿ greatest hel. lat. S.
	5	6	♃ in □ with the ☉
	11	44	Ecliptic oppo. or ○ full moon
11			Occul. κ Geminorum, im. 5h. 10m. em. 5h. 57m.
11	15	6	♂ in conj. with Pallas, diff. of dec. 23. 31. S.
12	12	21	♃'s third sat. will im.
	15	54	♃'s third sat. will em.
13	7	13	Juno in oppo. to the ☉ intens. of light 3·943
14			Mercury R.A. 16h. 28m. dec. 21. 28. S.
—			Venus R. A. 20h. 4m. dec. 22. 23. S.
—			Mars R. A. 16h. 8m. dec. 21. 3. S.
—			Vesta R. A. 23h. 55m. dec. 9. 9. S.
—			Juno R. A. 5h. 30m. dec. 1. 24. S.
14			Pallas R. A. 16h. 5m. dec. 2. 48. N.
—			Ceres R. A. 16h. 9m. dec. 17. 42. S.
—			Jupiter R. A. 9h. 40m. dec. 14. 48. N.
—			Saturn R. A. 23h. 23m. dec. 6. 22. S.
—			Georg. R. A. 1h. 8m. dec. 6. 38. N.
—			Mercury passes mer. 22h. 57m.
—			Venus passes mer. 2h. 31m.
—			Mars passes mer. 22h. 34m.
—			Jupiter passes mer. 16h. 4m.
—			Saturn passes mer. 5h. 49m.
—			Georg. passes mer. 7h. 34m.
14	11	4	♃ in conj. with the ☽ diff. of dec. 5. 26 N.
	14	26	♃'s second sat. will im.
	18	22	♃'s first sat. will im.
	16	36	♂ in conj. with Ceres, diff. of dec. 3. 23. S.
15			Occul. o^1 Sextantes, im. 12h. 35m. em. 13h. 28m.
—			Clock after the ☉ 4m. 26s.
—			☽ rises 10h. 11m. A.
—			☽ passes mer. 4h. 16m. M.
—			☽ sets 11h. 20m. M.
16	12	50	♃'s first sat. will im.
17	5	20	Vesta in □ with the ☉
	8		☿ in the descending node
	11	13	☽ in □ or last quarter
25			Clock after the ☉ 1m. 57s.
—			☽ rises 2h. 33m. M.
—			☽ passes mer. 8h. 2m. M.
—			☽ sets 1h. 23m. A.
21	4		☉ enters Capricornus, Winter commences
	17	2	♃'s second sat. will im.
	18		☽ in Apogee
23	4	7	♂ in conj. with the ☽ diff. of dec. 5. 13. S.
	14	43	♃'s first sat. will im.
24	9	20	☿ in conj. with the ☽ diff. of dec. 5. 44. S.
25			Clock before the ☉ 0m. 33s.
—			☽ rises 7h. 25m. M.
—			☽ passes mer. 11h. 51m. M.
—			☽ sets 4h. 17m. A.
	4	22	Ecliptic conj. or ● new moon.
	9	12	♃'s first sat. will im.
27	11	41	☿ in Aphelion
28	10	4	♃'s third sat. will im.
28	14	9	♃'s third sat. will em.
28	17	1	♀ in conj. with the ☽ diff. of dec. 4. 20. S.
30	16	37	♃'s first. sat. will im.
31	5	48	♄ in conj. with the ☽ diff. of dec. 1. 44. S.

J. LEWTHWAITE, Rotherhithe.

THE

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CONJOINED SERIES.

No. CCV.

RECENT PATENTS.

To JAMES PETRIE, *of Rochdale, in the county of Lancaster, engineer, for certain improvements in steam-engines.*—[Sealed 10th April, 1848.]

THIS invention of certain improvements in steam-engines consists principally in certain additions to, or improvements upon, an invention, for which letters patent were granted to the present patentee on the 22nd May, 1844.*

In the specification of the former patent, the invention was stated to consist, firstly, in the particular application of, and mode of working, certain sliding-valves or cutting-off plates, placed in the inside of, and worked in connection with, the common D, or slide-valves of steam-engines; and, secondly, in a method of connecting the aforesaid cutting-off plates or slides (and their operating apparatus worked, in connection with the common D, valves) with the ordinary governor of the steam-engine, so that the steam may be cut off earlier or later, by the action of the governor, as the power required is less or more.

The present invention consists, firstly, in the method of connecting the said "cut-off slides" to the other working parts of the apparatus; secondly, in the peculiar arrangement of mechanism employed to produce the requisite motion of the cut-off slides; thirdly, in the method of connecting the governor with the differential apparatus, so as to set the "cut-off cam" either earlier or later, by the action of the governor; and, fourthly, in certain arrangements of mechanism, for the purpose of indicating at what point of the stroke of the engine the steam is cut off, and for altering the same, either sooner or later, by hand, as may be required.

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* For specification of this patent see Vol. XXVI., p. 1, Conjoined Series.

In Plate XVI., fig. 1, is a side elevation of the cylinder of a steam-engine, shewing the valve-boxes and valves in section; and fig. 2, is a front view of the side pipes and valve-boxes of a steam-engine,—a portion of the front of the valve-boxes being removed, and the valves shewn in section. A, A, is the steam-cylinder; B, B, the D or slide-valves; and C, C, are the cutting-off slides. These slides are connected to the other working parts, hereafter mentioned, in the following manner:—The ordinary spindle or rod used for working the D-valves, is now made hollow, as shewn at *a, a*; and through this the spindle *b, b,* which is connected to the cut-off valves, passes,—it being attached at the lower end to a sliding stuffing-box or "boot," working or sliding on the hollow valve-rod *a, a.* The D-valves are attached to the hollow rods *a, a,* by cross-bars and rods *c, c.* It is obvious that, where required, as in marine or other engines, the cutting-off slides may be worked from the top end of the side-pipes or valve-casing. *d, d,* is the cross-shaft, for working the D or slide-valves (see also fig. 3, which is a plan view of the cross-shaft); between the arms *e, e,* of which there is a centre or fulcrum *f,* upon which a lever *g,* g^1, vibrates. This lever *g,* is so constructed and arranged that one end thereof nearly coincides with the centre of motion of the shaft *d,* and the other end with the ends of the arms *e, e,* whilst the fulcrum *f,* is betwixt the two. Now, it will be evident, that upon motion being communicated to the cross-shaft *d,* by means of the lever *h,* and excentric rod *i,* as usual, as long as the end *g,* of the said lever is held in the centre of motion of the cross-shaft *d, d,* the other end g^1 of the said lever will have the same movement as the ends of the arms *e, e,* of the cross-shaft; and the said cross-shaft being attached by the links and cross-bar *k, k,* to the hollow valve-rod *a, a,* and the end of the lever *g,* g^1, to the cut-off slide-rod *b, b,* then the valves B, B, and the cut-off slides C, C, will have the same motion: that is, the cut-off slide will remain stationary in the interior of the D-valve. But, if the end *g,* of the said lever be now raised or depressed above or below the centre of the cross-shaft, the cut-off slides C, C, will have a corresponding change of position in the interior of the D-valves, so as to cover or uncover the sluice through which the steam passes; and they will retain that relative position as long as the end of the lever *g,* remains raised or depressed above or below the centre of motion of the shaft *d*: by this means the head-stock, carrying the differential motion, may now remain stationary, instead of sliding backwards and forwards, as described in the previous patent. Another mode by which this may be effected is as follows:—Instead of the lever *g,* g^1 vibrating on a fulcrum between the arms of the cross-shaft, it may vibrate on a fulcrum suspended from the arms of the cross-shaft; or this compound motion of the cut-off slides may be effected without any modification of the cross-shaft which works the D-valves, by means of an arrangement of mechanism similar to either of the before-mentioned arrangements, placed in any convenient situation, and connected with the cam and the cut-off slides.

The third and fourth parts of the invention are seen best at figs. 4, and 5. Fig 4, is a plan view of part of the crank-shaft, excentric, and rod of a steam-engine, with the differential apparatus applied thereto, shewing a method of driving the cam; and fig. 5, is an elevation of the same, shewing a method of connecting the differential apparatus to the governor—also a method of indicating the point of the stroke at which the steam is cut off—and an arrangement for setting the cutting-off cam sooner or later, by hand, as required. The governor-spindle *l,* is made tubular, as usual; and in the interior is a rod, connected to the sliding-ferrule *m,* by a cotter, the other end of which rod raises or lowers a driver *n,* which passes through a slot in the hollow spindle *l.* This slot is situated between two bevil-wheels *o,* o^1, the faces of which are furnished with projecting-pins *p,* p^1; the said wheels *o*, o^1, being loose upon the spindle *l*. Both of these bevil-wheels *o*, o^1, are in gear with a third bevil-wheel *q*, and, consequently, when the balls *r*, *r*, of the governor rise (by centrifugal force) the driver *n*, is raised, and comes in contact with the two projecting pieces p^1, p^1, in the face of the upper bevil-wheel o^1, and thus turns the wheel *q*, in a certain direction. When the balls *r*, *r*, fall, the driver *n*, comes into contact with the pins *p*, *p*, in the face of the lower bevil-wheel *o*, and thus turns the wheel *q*, in the opposite direction. The bevil-wheel *q*, is connected, by friction, to the stud r^*, which, by means of the change-wheels *s*, *s*, and bevil-wheels *t*, t^1, drives the upright shaft *u*, upon which the worm *v*, is keyed. The worm *v*, takes into the teeth of the quadrant *w*, and thus sets the cam *x*, earlier or later. The change-wheels *s*, *s*, are employed, in order to give the most suitable relative speed of the governor-spindle *l*, and the worm or quadrant *w*; as it will be found, in practice, that in some cases the cam *x*, is required to change quicker than for others, to ensure regularity in the speed of the engine. When it is required to alter the position of the cam *x*, by hand, the bevil-wheel t^1, at the upper end of the vertical shaft *u*, must be lifted out of gear with the bevil-wheel *t*,—thus breaking the connection between the worm-shaft *u*, and the governor, so that the said shaft can be turned round by hand; and, by this means, the position of the cutting-off cam *x*, can, at any time, be altered, by hand, to any situation required. In order that it may always be known at what part of the stroke of the engine the steam will be cut off, there is a nut upon the upright shaft *u*, which is screwed for the purpose; this nut rises or falls, as the cam may be put backwards or forwards; and, to the nut, a pointer or finger *y*, is attached,—the position of which, upon the index-plate *z*, (on which is a scale, representing the stroke divided into fractional parts) indicates the point of the stroke of the engine at which the steam is cut off. The engineer can thus, at any time, ascertain, by inspection, whether or not the steam is being cut off as early as it should be. The worm-wheel *w*, requires teeth upon a portion only of its periphery, so as to allow of its making a fourth of a revolution; as it is evident, from the nature of the differential apparatus, that one-fourth of a revolution of the worm-wheel *w*, causes one-half of a revolution of the cam *x*,—and that this comprises the whole stroke of the engine. The reason why the bevil-wheel *q*, is connected to its stud by friction, as before mentioned, is, that it may revolve on its axis, should the worm-wheel *w*, be turned by the governor to the end of the toothed part of its periphery. The construction of the differential apparatus is also improved; the bevil-wheels 1, and 2, are both placed loose upon the shaft, and are furnished with long bosses; upon one of which the cam *x*, is fixed, and upon the other a spur-wheel 3, is keyed, which is driven by a similar wheel 4, keyed upon the crank-shaft D, of the engine; also the worm-wheel *w*, is furnished with two planet-pinions 5, 5, and is keyed fast on the shaft. The differential apparatus may be driven by spur or bevil gear from the crank-shaft or other shaft. Instead of a worm-quadrant, a lever, with a swivelling-nut at the end, may be employed.

The patentee claims, Firstly,—the peculiar method of connecting and working the cutting-off slides. Secondly,—the method of varying the position of the cut-off cam by means of the governor. And, Lastly,—the arrangement of mechanism for indicating at what point of the stroke of the engine the steam is cut off, and the method of setting or adjusting the same, either earlier or later, by hand, as may be required. —[*Inrolled in the Rolls Chapel Office, October,* 1848.]

To WILLIAM MAC LARDY, *of Salford, in the county of Lancaster, manager, and* JOSEPH LEWIS, *of the same place, machine-maker, for their invention of certain improvements in machinery or apparatus applicable to the preparation and spinning of cotton, wool, silk, flax, and other fibrous substances.*—[Sealed 9th May, 1848.]

THIS invention applies to those well-known machines used in the preparation of cotton, &c., called "slubbing-frames," and "roving-frames," or "jack-frames;" and also to those well-known spinning-machines called "throstle-frames."

The object of the present improvements is, first, to increase the productive power of the above-named machines, by working them more economically than heretofore. This is effected by the employment of a peculiar construction of spindle, which, although driven by pinions or warves, mounted thereon in the usual position, and although working in a top-bearing (which prevents vibration, and allows of the spindle being driven with great rapidity), will, nevertheless, admit of the bobbin being doffed with great expedition, without the spindle being removed from its bearings, or its driving parts being disarranged. Secondly, the object of the invention is to obviate the necessity of requiring an entire new spindle or spindles for these machines when only the bearing parts of the spindles are worn. This is effected by putting hoops of steel, cast-iron, or other suitable metal, upon the spindle, to form the bearings thereof. By this means the friction of the bearings will not wear the spindle itself, but only the hoop upon the spindle which forms the bearing; so that when the bearings become worn, it is only necessary to apply new hoops, to form new bearings,—thus obviating the necessity of requiring an entire new spindle. The improved spindle is constructed of two parts, which are connected together above the bearing, usually called the bolster, which, in ordinary slubbing and roving-frames, traverses with the copping-rail, but is sometimes stationary in throstle-frames. This connection is formed in such a manner that the parts constituting the spindle shall revolve together, as if the spindle were made in one piece, and present the appearance of one continuous rod at that portion of its length over which the bobbin traverses when raised and lowered by the copping-rail, and otherwise working on the spindle in the same manner as upon the common spindle now in use. The peculiar construction of joint, coupling, or connection of the upper and lower parts of the spindle is of little moment, so long as the parts will revolve together, and allow of the easy disconnection of the parts, in order to doff the bobbin.

In Plate XVIII., fig. 1, represents the two parts of a slubbing or roving-spindle, disconnected;—the two parts are turned or ground to a uniform diameter, *a*, *a*, being the upper part, and *b, b,* the lower part. The upper end at *n,* is tubular, as shewn by dotted lines, having an orifice for the passage of the thread of cotton, or other material. The other end of this part of the spindle is bored out, as shewn by dotted lines at *c,* for the purpose of receiving the top of the lower part of the spindle at *d,* which is reduced in diameter, for the purpose of being inserted. A portion of this part *d,* is cut in a forked manner, for receiving the pin (shewn at *c,*) of the upper part; so that when the two parts are connected, or put together, they will, by means of this joint, revolve together, as if the spindle were composed of one piece. Fig. 2, represents the two parts of the spindle, thus put together or connected. The step of the spindle *e,* is formed in the usual manner; and a portion of the upper part of the spindle *i,* is reduced in diameter,—the use of which will be shewn in explaining fig. 4. Fig. 3, represents a slubbing or roving-spindle, as mounted for working. The lower part of the spindle *a, a,* rests in the footstep *b,* and is supported by the bolster-bearing *c,* which is securely fastened in or to the copping-rail. The upper part of the spindle *d,* is supported by the rigid-bearing *e, e,* which is securely fastened to the roller-beam of the machine; the other end of this part of the spindle is connected to the lower part *a,* of the spindle, as formerly described and shewn in figs. 1, and 2. It will be seen, that the spindle is thus supported or kept in its position by three several bearings,—namely, the step *b,* the bolster *c,* and the top bearing *e.* The flyer *f, f,* is permanently fastened on the upper part *d,* of the spindle by a pin at *g,* and an orifice is formed in the flyer, corresponding with the orifice in the spindle formerly described, through which the thread passes, thence down the leg of the flyer *f,* and round the "presser" to the bobbin in the usual manner. The bevil-pinion *o,* is fast to the spindle near the footstep *b,* and receives motion from a shaft passing along in the usual manner. It will thus be understood, that the spindle and flyer revolve together at a uniform speed, as if the spindle were one solid piece. The bobbin *m, m,* and the pinion *r,* for working the same, are both loose on the spindle, and receive motion from a shaft, which passes along the copping or bolster-rail, and is caused to vary in speed in the usual manner, to suit the increasing diameter of the bobbin whilst being filled. Fig. 4, represents the upper part of the spindle and flyer, raised and disconnected from the lower part, and at such an angle as to allow of the bobbin being taken off the spindle, by being passed downwards. That portion of the top part of the spindle which is reduced in diameter at *i*, is for the purpose of allowing the upper part *a*, of the spindle taking the angular position shewn, when disconnected from the other part of the spindle, for the purpose of doffing the bobbin; for, when the reduced diameter of the spindle enters the bearing *e*, it is obvious that it will fit it loosely: the advantages, therefore, of getting sufficient space between the connecting ends of the parts *a*, and *b*, of the spindle for doffing, is obtained by holding the part *a*, at an angle,—thus obviating the necessity that would otherwise arise, with the jointed-spindle working in a rigid top-bearing, of lifting the spindle from the frame to doff the bobbin. Figs. 5, and 6, are similar views of two throstle-spindles, excepting that the orifice in these spindles, for the thread to pass through, is immediately under the top-bearing, and the thread is wound round the leg of the flyer in the usual manner;—the bobbin is loose on the spindle, and takes up the yarn in the same manner as the common spindle, by what is technically called "the drag." Fig. 7, is a view of the throstle-spindle, detached, and shewing a slight modification in the construction of joint for connecting the upper and lower parts of the spindle together. In this instance, the lower end of the upper part, in addition to being bored out, is also slotted, and the part *d*, is provided with a pin, to drop into the slot; but the connection may be made in any other convenient manner which will allow of the upper and lower part being driven together, and admit of the bobbin traversing over the joint when working. Fig. 8, represents a throstle-spindle somewhat differently constructed. *a*, is the top part of the spindle; *b*, is the bottom part, which bears in the footstep *f*, and is supported by the fixed bearing-rail *c*. The joint in the spindle is made at *e*, in the same manner as the joints shewn at fig. 7. *d*, is the copping-rail. In this arrangement the copping-rail will require to be down near the bearing-rail *c*, before the operation of doffing can be performed; the doffing may then be done in the same manner as shewn at fig. 6. In using a spindle of this description the bobbin would not traverse over the joint, as at figs. 5, and 6.

Fig. 9, shews the method of applying the second part of the invention to an ordinary throstle-spindle, the hoops, forming the bearing-surfaces, being shewn in section. *a*, is the bolster-bearing, and *b*, the footstep-bearing. These bearings are formed of hoops of steel, cast-iron, or other suitable metal, driven tight on to the spindle, and may be fastened by a pin, if necessary. In using cast-iron hoops, the centre-point of the footstep may be of steel, by its protruding through the hoop, as shewn at *c*. It will be evident, that this part of the invention is equally applicable to all kinds of spindles used in the preparation and spinning of cotton and other fibrous substances.

The patentees claim, generally, the peculiar construction of spindle hereinbefore described with reference to the drawing, whereby they are enabled to doff the bobbins from spindles which work in top-bearings, and are driven by warves or pinions below the copping-rail, as usual, without removing the flyers or the spindles, or a part thereof, from the slubbing, roving, jack, or throstle frame. And, particularly, they claim the constructing of spindles in two parts, and connecting them together in such a manner and at such part of their length, by a socket joint or other suitable attachment, that the bobbins will freely traverse over such joint,—the object being to raise the upper part of the spindle a short distance in its top-bearing, and allow of the bobbin being readily doffed, by being taken off between the two parts of the spindle so disconnected. And further, with respect to spindles composed of two parts, they claim the reduction of the diameter of a portion of such spindles near their top, whereby, when the upper part of the spindle is raised, the smaller diameter thereof will enter the top-bearing and allow of the upper part of the spindle being placed at a sufficient angle to doff the bobbin by passing it off between the two parts of the spindle without removing the spindle or a portion thereof from the frame. Lastly,—they claim the putting of hoops of steel or any other suitable metal upon spindles, to form the bearings thereof, as herein described and represented by the drawings. — [*Inrolled in the Petty Bag Office, November,* 1848.]

To William Edwards Staite, *of Peckham, in the county of Surrey, Gent., for certain improvements in lighting.*—[Sealed 12th November, 1846.]

This invention relates to the production of light by means of currents of voltaic electricity; and consists, firstly, in certain improved arrangements of apparatus for obtaining a continuous light from or through the agency of the said currents; secondly, in certain improved arrangements of apparatus for obtaining an intermittent light from or through the said agency; and, thirdly, in manufacturing, by certain new combinations and processes, carbon of a quality more suitable for the exhibition or development of electric light than any hitherto employed.

Firstly, as regards the improved arrangements of apparatus for obtaining a continuous light, from or through the agency of currents of voltaic electricity, the same are founded upon the following facts:—Electric light is best developed when a check is given to the passage of the current, by the introduction into the circuit of an electrode or electrodes, composed of substances which are imperfect conductors of electricity, and are capable (as carbon and platinum) of sustaining an intense degree of heat. The light is also best developed if the two imperfectly-conducting substances are first brought into contact, to complete the circuit, and then, after a moment or two, are separated, and kept at a certain short distance apart. Under these circumstances, one of the electrodes becomes instantly heated to incandescence, and highly luminous, and it continues so until, by the gradual wasting away of the substance of which it is composed, the distance between the two electrodes is increased beyond the distance required for maintaining the electric circuit: therefore, to make the light continuous, it is requisite that one of the electrodes should have a continuous movement towards the point of ignition, corresponding very nearly with the rate at which it is consumed. It has been further ascertained, that it is in general preferable to have one of the electrodes of a conical shape, while the other may be round, flat, or conical; or the electrodes may be in the form of two concentric cylinders. It has likewise been ascertained, that the more rarefied and deoxygenated the air around the point of ignition is, the more continuous and brilliant will the light be; and therefore it is advantageous to enclose the electrodes in a vessel of small dimensions, hermetically sealed from the external atmosphere, but furnished with a valve, through which the included air may escape, when its expansive pressure becomes too great.

In Plate XVII., fig. 1, is a sectional elevation of an electric lamp, constructed according to this invention. A, is a glass plate, fitted in a brass ring A^1; and B, is a glass dome or cover, which rests in a circular groove in the plate A. W^1, is one of the wires, which is carried from the battery upwards through the plate A, nearly to the top of the cover B, where it is curved, and terminates in a copper holder C; into which a solid cylinder of carbon D, is inserted, and is held therein by a binding-screw: at the point where the wire passes through the plate it is fitted with a collar and nut, and with washers of vulcanized India-rubber or gutta-percha; so that, by screwing up the nut, the opening, through which the wire passes, is closed airtight. W^2, is another wire, leading from the battery to a copper tube E, which passes up through the centre of the plate A, and encloses a solid cylinder of carbon F, formed with a conical top. G, G, are two triangular pieces of platinum, attached to the upper ends of two vertical springs; the lower ends of which are fixed to two shoulder-pieces on the outside of the tube E; and the pieces G, serve as guides to the stick of carbon F, when it is pushed upwards beyond the upper end of the tube E, towards the point of ignition. H, is a spindle, the top of which presses against the lower end of the stick of carbon F; it is formed with a rack at one side, into which a pinion I, gears; and this pinion is connected with a train of wheels (not shewn in the drawing), by means of which the stick of carbon may be caused to rise with the desired speed: the rate to which the clockwork is to be adjusted will depend on the power of the battery employed. K, is a spring, attached to the tube E, just below the part where it passes through the plate A, and kept up against the plate by a screw-collar L: the play given to this spring is made exactly proportionate to the least space which there should be between the electrodes when the electric lamp is in action or exhibiting light; so that, by pressing against it with the finger, the tube E, to which it is attached, will be raised, and the electrode contained in the tube be instantly brought into contact with the other electrode. M, is a collar, upon the tube E, between which and the plate A, a washer of vulcanized India-rubber or gutta-percha is placed, so as to close the opening in the plate A, (through which the tube E, is inserted) airtight. N, is a valve, through which the air escapes from beneath the cover B, when it attains too high a degree of rarefaction and pressure.

Fig. 2, is a sectional elevation of another electric lamp, in which the two electrodes are placed in lateral instead of perpendicular opposition to one another, and the clockwork is dispensed with. C, and E, are two copper tubes, which are respectively connected to the wires W^1, and W^2; they contain two carbon electrodes F^1, and F^2; and each tube is provided with a coiled spring O, in the upper end of it, which exerts a continuous pressure on the stick of carbon beneath. P, is a cylinder, of compressed pipe-clay, phosphate of lime, or other like non-conducting and heat-resisting substance, against which the ends of the two electrodes press, when in action; so that, as this cylinder counteracts the pressure of the springs O, O, the electrodes can be protruded only in the same proportions as they, or either of them, may happen to be consumed. The wire W^1, is passed through an oblong slot in the plate A, of such length as to permit of a lateral movement of this wire, and of the tube E, attached to it, equal to the distance at which the two electrodes should be kept apart when the lamp is in action; and a small sliding-box Q, is attached to the wire, at the point where it passes through the slot; by means of which the lateral movement may be effected without permitting the external air to enter through the slot;—the box Q, being moved to the required position by turning the thumb-screw R.

Fig. 3, exhibits a modification of the lamp just described. In this case, one of the electrodes consists of two sticks of carbon F^1, F^2, enclosed in two copper holders E^1, E^2, with pipe-clay prolongations S^1, S^2, which are united at top, and form one piece; and the other electrode consists of one stick of carbon D, enclosed in a copper holder C, with pipe-clay prolongation T. The under end of the electrode D, presses against the top of the piece of pipe-clay S^1, S^2, while the upper ends of the other electrode F^1, F^2, press against the piece of pipe-clay T; and therefore, although each stick of carbon is continually urged outwards by a coiled spring U, it cannot be protruded in a greater degree than it wastes away. The arrangements for giving a lateral motion to the electrodes, so as to bring them into contact, and then to move them away from each other, are similar to those mentioned in the description of the lamp shewn at fig. 2.

Fig. 4, represents a modification of the lamp shewn at fig. 1, from which it differs in three particulars, viz., first, in the relative position of the electrodes being inverted (the smaller, F, being uppermost, and the larger, D, being undermost); secondly, in the electrode D, being enclosed in a cylinder of pipe-clay P, from which two standards V, V, rise, to support the platinum guides G; and, thirdly, in the guides G, being attached to the ends of spindles of platinum, and pressed forward by coiled springs of platinum wire.

Fig. 5, represents an arrangement in which platinum is employed as one of the electrodes, and a hollow cylinder of carbon as the other, and the progressive movement of the latter is effected without the aid of wheel-work. C, is a copper cylinder, containing a hollow cylinder of pipe-clay C^1, the interior of which is made of a slightly conical form, with the largest diameter uppermost; D, is a thick ring of platinum, the inner periphery of which is bevilled, in the manner shewn, and it is fixed on the top of the copper and clay cylinders C, C^1; and E, is a copper cylinder, enclosing the hollow cylinder of carbon F, the interior of which is filled by a solid cylinder of pipe-clay G. The compound cylinder F, G, is made of such diameter that, when pressed downwards by the coiled spring H, it shall just pass through the platinum ring D, without touching the bevilled edge thereof; but immediately below that ring it will be stopped by coming in contact with the interior of the pipe-clay cylinder C^1, until its diameter is lessened by the wasting away of the carbon under the action of the voltaic current.

The second part of this invention consists in certain improved arrangements of apparatus for producing an intermittent light from or through the agency of electric currents; which light is to be employed in situations where it is necessary that the same should be intermitted more or less frequently,—as for example, where flashes of light, with various intervals of time between them, are employed as signals for the conveyance of intelligence from one place to another. In this case a voltaic battery and an electric lamp (of any of the forms above described, or of any other analogous or approved form) are provided at each terminal place or station, and the voltaic battery at each station is connected directly with the electric lamp at the other station; and then intermittent flashes of light may be produced by breaking the connection as often as requisite, by the same means as are now used for that purpose in electric telegraphs. In order to multiply the number of flashes which can be made within a given time, and to diminish the intervals required between them, the patentee employs two, three, or more wires of communication between each battery and lamp, and uses as many distinct sets of electrodes as there are wires; and he likewise encloses each pair of electrodes in a glass vessel of a different color, such as white, red, green, blue, or yellow. The character of the flashes may, by this means, be varied at pleasure, without allowing more than a single instant of time to elapse between them,—for instance, each vowel may be indicated by a flash of a particular color, and each consonant by two, or at most three flashes of different colors, variously arranged in point of succession; so that each flash being distinguishable by color from that which precedes and follows it, the interval between them may be the smallest possible.

The third part of the invention consists in the following mode of obtaining carbon, of a quality more suitable for the exhibition or development of electric light than any hitherto used:—Equal quantities of coal, of a medium quality (neither too rich nor too poor), and coke, of that kind which is known as "Church's patent coke," are reduced to a state of powder, and mixed together; then the mixture is heated and compressed in close sheet-iron moulds till it becomes consolidated into a concrete mass; this mass is plunged into a concentrated solution of sugar; and, when sufficiently dry, it is subjected for several hours to an intense white heat, in a close vessel containing pieces of charcoal. The patentee states, that carbon, prepared in this manner, is of an exceedingly dense and homogeneous quality, and is possessed of the required amount of conductability for the purpose of lighting. He also states, that the above process differs from that adopted for the production of "Bunsen's carbon," chiefly in the substitution of Church's patent coke for common coke; and although Bunsen's carbon is suitable for the purposes of this invention, it is inferior to carbon prepared in the manner just described.

The patentee claims, Firstly,—the several arrangements of apparatus for obtaining a continuous light from or through the agency of voltaic electricity, in so far as regards the means adopted in each, of producing and breaking contact between the electrodes—of imparting to one of them a continuous movement towards the point of ignition and illumination, corresponding with the rate at which the same is consumed—and of enclosing the ignited and illuminated bodies in a warm and rarefied atmosphere. Secondly,—the arrangement of apparatus, above described, for the production of an intermittent light. Thirdly,—the improvement in lighting, by the use of carbon, suitable for the exhibition or development of electric light, and manufactured of the materials and in the manner above described.—[*Inrolled in the Inrolment Office, May,* 1847.]

To William Edwards Staite, *of Lombard-street, in the city of London, Gent., for certain improvements in lighting, and the apparatus or apparatuses connected therewith.*—[Sealed 3rd July, 1847.]

The first part of this invention consists in improvements on the invention described in the specification of a former patent, obtained by the present patentee November 12, 1846.* The object of this branch of the invention is to impart more surely such motions to one of the electrodes of the apparatus, that the light may be preserved from going out, be kept more uniform, and be renewed by the action of the apparatus itself whenever it has been put out,—provided always that the electric current is maintained.

In Plate XVII., fig. 6, is an elevation of an apparatus, embodying these improvements; fig. 7, is a plan view, taken in the line *y*, *z*, of fig. 6; and fig. 8, is a sectional elevation, taken in the line *w*, *x*, of fig. 7. M, and N, are two cylinders of carbon, prepared as hereinafter described, which are used as the electrodes: that is to say, the current of electricity is passed from one to the other as they stand end to end,—their ends being separated by an interval of from less than $\frac{1}{20}$th to about $\frac{1}{2}$ an inch, according to the power of the electric current used. The upper electrode N, is passed vertically through a hole in the summit of the metallic support or tripod K, and fixed by binding-screws. The lower ends of the legs of the tripod are passed through holes in the plate A, and secured in their positions by collars and nuts,—being prevented from coming into metallic contact with the plate A, by washers *a*, of dry hard wood. The legs are provided at the bottom with set-screws L, for the purpose of securely holding a conducting-wire, which passes through the extremities of the legs, and is connected with one end of the coil of the regulator R; the other end of the coil is led to a clamp B^2, fixed at one side of the wooden basement B. The basement B, is mounted on four short supports *b*, to allow room for some parts of the apparatus which project below the basement; and the plate A, is firmly attached to the basement B, by four pillars *c*.

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* For description of this invention see p. 390, antè.

C, and D, are two cones, which spring from opposite sides of the plate A; the apices of these cones are perforated, to admit the shaft O, which has a socket at its upper end, wherein the electrode M, is placed, and is retained in a central position by the set-screws *d*. A portion of the shaft O, immediately beneath the socket, is formed perfectly smooth, so that it may pass freely through the hole in the apex of the cone C; and the length of this smooth part is equal to the distance between the apices of the cones, which is the extent of the ascending motion that can be given to the shaft, to compensate for the wear or shortening of one of the electrodes while the light is in action. The lower part of the shaft O, which corresponds in length with the smooth part, has a screw-thread formed upon it; this screw-thread works in a nut *e*, fixed to the apex of the cone D; and it is formed with such a degree of inclination as to cause the shaft to rise $\frac{1}{12}$th of an inch for each complete revolution. The screwed part of the shaft is placed in the centre of a tube P; which tube has two longitudinal grooves formed in it, to receive the edges of a cross-piece Q, (shewn detached at figs. 9, and 10,) affixed to the lower end of the shaft O; so that when the tube P, is made to revolve, it carries the shaft O, round with it, by means of the cross-piece Q; and, by the action of the screw-thread within the nut *e*, the shaft O, is, at the same time, caused to rise or fall.

The tube P, turns on a pivot *g*, that works in the bottom of a circular box H, which is screwed into a hole in the brass plate G, affixed to the wooden basement B: the lower end of the pivot *g*, and the surface on which it bears, are coated with silver, as that metal preserves a surface peculiarly fitted for receiving the current of electricity. The upper end of the tube P, receives the lower part of the fixed nut *e*, on which the tube turns as on an axis. On the upper part of the tube P, a worm-wheel S, of 40 teeth, is fixed, and motion is communicated thereto by a horizontal double-threaded tangent-screw T, the pitch radius of which is $\frac{1}{10}$th of an inch; to one end of the screw is attached a crown-wheel U, of 40 teeth, which is actuated by pinions v, and w, on an upright spindle x. The pinions are at a somewhat greater distance apart than the diameter of the crown-wheel U, and gear into it from opposite sides; so that when the spindle x, is raised a little, the lower pinion v, of 8 teeth, gears into the lower side of the crown-wheel; but, when the spindle is lowered, the pinion v, is thrown out of gear, and the upper pinion w, gears into the upper side of the crown-wheel; and as the spindle continues to revolve in the same direction as before, it imparts a reversed rotation to the crown-wheel: when the spindle is kept at a medium degree of elevation, neither of the pinions is in gear with the crown-wheel. The spindle x, is kept in its position by working through a hole in the middle plate F; which plate is firmly attached to three of the pillars *c*. The upper end of the spindle works through a hole in the centre of the bottom of a circular brass box I, and carries a centrifugal regulator Y, which consists of a piece of watch-spring, bent into the form of the letter S, (as shewn in the plan view, fig. 11,) carrying two small weights *h*, at its ends, and fixed at its centre, in a horizontal position, to the top of the spindle: when the spindle is made to revolve too fast, the weights at the end of the spring fly outwards, and, by rubbing against the side of the box, check the motion of the spindle. Just below the centrifugal governor there is a cross-piece *i*, inserted through a transverse hole in the spindle x; so that when the spindle is at its medium degree of elevation (*i. e.*, when its two pinions v, and w, are neither of them in gear with the crown-wheel) the ends of the cross-piece *i*, meet a stop *k*, and so stop the revolutions of the spindle; but, on the spindle being raised or lowered, the cross-piece *i*, no longer meets the stop *k*, and the spindle is permitted to commence its revolutions just before one of the pinions gears into the crown-wheel. The spindle x, is actuated, and kept in a state of constant readiness to revolve in one direction, by a toothed wheel z, keyed upon it, and gearing into a train of wheel-work w^2, which is driven by a spring in a barrel *l*, acting on a fusee *m*, driven by a cord or weight.

The mode in which the spindle x, is raised or lowered, so as to drive, stop, or reverse the motion of the crown-wheel U, is as follows:—The bottom of the spindle rests on a plate of ivory *n*, which is supported by a brass stem *o*, screwed into a hole in the top of a solid cylinder of pure soft iron *p*; this iron can move freely up and down in the central hole of a reel *q*, around which a quantity of insulated copper wire is wound; one end of this wire is led to the binding-screw B, as before mentioned, which connects it with the positive wire of the galvanic generators, and the other end to the wire which passes through the legs of the tripod K. The reel *q*, is fixed to the wooden basement B, and is covered by a cap *r*, r^1, made of soft iron and brass (the part *r*, being made of soft iron, and the part r^1, of brass); and through the central part r^1, of the cap, the brass stem *o*, passes. The action of the electricity in the coil of the regulator R, causes the iron cylinder *p*, to rise or fall, according to the quantity of electricity passing; and, in so doing, to elevate or depress the spindle X. There is a little eye attached to the bottom of the cylinder *p*, from which is suspended a counterpoise F^1, of such weight that the cylinder *p*, will be just in equilibrium, or just ready to rise, when the distance between the electrodes is such as to allow the electric current to flow freely enough to produce a steady and certain light. There is also a little ledge *s*, around the lower end of the cylinder *p*, designed to support a circular brass plate *t*, which, when the cylinder *p*, falls below the neutral point, becomes supported by a brass ring *u*, (attached to the basement B, by a strip of brass *w*,) and is left behind on it when the cylinder continues to descend,—thus relieving the latter of its weight; while, on the other hand, if the cylinder *p*, rises above the neutral point, it has to lift the whole weight of the brass plate *t*. This arrangement gives the cylinder *p*, a tendency to remain stationary at the neutral point, which is that point at which the elevation of the spindle X, enables the cross-arm *i*, to come into contact with the stop *k*, and arrest the rotation of the spindle, and so prevent unnecessary working of the machinery until the electric current has varied so much as to render desirable an adjustment of the distance between the electrodes, which the cylinder *p*, effects, as before described, by rising or falling.

The sliding cross-piece Q, before mentioned, is constructed in the manner represented at figs. 9, and 10;—fig. 9, being a side view, and fig. 10, a horizontal section. A spring 2, (of thin hard brass, for instance) is attached to one side of the cross-piece by a small screw 3; so that when the cross-piece is placed in the grooves of the tube P, the spring always remains in close though not forcible contact with the sides of the grooves, so as to ensure a good conduction to the electric current, which has to traverse the shaft and enter from the cross-piece into the tube P. A cone of white glass or porcelain E^3, is made to slip over the upper cone C, and is turned up at the edges, to reflect the light better, and to catch any dust and ash which may be thrown off from the electrodes. A glass shade, which may be ground partially or not, as desired, fits over the electrodes M, N, and the stand K, and its lower edge is cemented into the brass circle E, which is screwed down to the plate A, whereby the outer air is effectually excluded from the electrodes. As soon as the electrodes have exhausted the oxygen which is within the glass shade, they are no longer so rapidly consumed; but when they are composed of some inferior sorts of carbonaceous preparations, they give light more steadily if a very small quantity of atmospheric air is continually allowed to enter; that is to say, just sufficient to burn away the button of carbon which sometimes forms on the end of that electrode which is not undergoing decomposition by the electric current. When there are no holes in the glass shade to admit a small quantity of atmospheric air, two light valves may be inserted in the plate A, one opening inwards and the other outwards, which would provide for the varying pressure of the air when the temperature is altered by the presence or absence of the light within. Two circular brass weights *a*, fit one over the other around the ivory plate *n*, which carries the pivot of the spindle X: their use is to enable an easier and more precise adjustment of the weight upon the cylinder *p*, to be made than can be effected by altering the large weight F^1, which is hung at the bottom of the cylinder *p*.

The electric current may be obtained from a galvanic apparatus of any of the constructions now in use, or from any other convenient source; and it may be used of various intensities and quantities. A good degree of intensity to use is such as would be afforded by one hundred cells in a series of the usual sort employed in galvanic apparatus; and the quantity of the said current may vary from that evolved by the consumption of less than one grain and a half of zinc per minute in each cell to that evolved by the consumption of more than fifteen grains of zinc per minute.

The wire from the positive pole of the galvanic apparatus is clamped with the binding-screw at B^2, and the wire from the negative pole is clamped with the other binding-screw at B^3, which is connected by a slip of copper to the plate G; so that the electric current entering the apparatus at B^2, passes through the regulator coil, and up to the electrode N, from which it descends to the electrode M, then traverses the shaft O, passes through the cross-piece Q, at its lower end, into the tube P, and thence proceeds through its pivot at bottom into the metal box H, which, being in metallic connection with the plate G, leads the current to that plate, from which it is conducted, by a slip of copper, to the other clamp, and from thence it passes through the wire to the negative pole of the galvanic apparatus. The current, when first applied with the electrodes in contact, flows freely, and that causes the regulator to raise the spindle X, and thus puts the apparatus into gear for screwing the shaft O, downwards, and gradually separating the electrodes, whereupon the light begins to appear between them.

The second part of the invention consists in the following mode or modes of manufacturing carbonaceous compounds of which electrodes are intended to be made:—About equal quantities are taken of coal, of medium quality, and of Church's patent coke, and both are reduced to a state of fine powder, and intimately mixed together. The mixture is then placed in close wrought-iron moulds, which may be made either to give the mixture the form of a block, to be afterwards cut into pieces of the required shape, or to give at once to the mixture the form of the intended electrode. The mixture being placed in moulds is subjected to heat and heavy pressure, until it becomes consolidated into a very dense and firm mass; this mass, while in a heated state, is plunged into sugar, melted by heat (without the aid of any liquid), and kept therein for a short time; it is then taken out, and, when cold, is placed amongst pieces of charcoal in a close vessel, which is gradually heated until it attains a full red heat; after which, the temperature is increased to an intense white heat, at which it should be kept for many hours, or even two or three days, according to the hardness and compactness desired; or the mass may be a second time immersed in the melted sugar, while hot, and the remainder of the process be repeated as before: by coating the mass in this way with melted sugar, any pores that there may be in it (on its external surface at least) are filled with carbonaceous matter, and any subsequent drying rendered unnecessary. Electrodes made of the improved preparation of carbonaceous matter are stated to be much superior to electrodes composed of gas-retort carbon; but the latter may be much improved by being gradually exposed to the strongest white heat of a furnace, for some days, in close vessels with charcoal.

The third part of the invention consists in a mode or modes of employing electric currents to actuate apparatus for effecting the speedy lighting up and extinction or obscuration of signal lamps, in which oil, camphine, or other like inflammable fluid is the illuminating matter employed. Suppose, for example, that there are three such lamps, with different colored glasses, say white, green, and red, which are required to be sometimes lighted, and at other times extinguished or obscured (as is usual on railways), and not all at once, but in a particular order of sequence, or each under particular circumstances only, the patentee effects this by means of three signal lamps, with colored glasses (white, green, and red); one of which lamps is represented, in vertical section, at fig. 12. A^1, is a bar of metal, which is connected with three extinguishers, one to each lamp; the bar A^1, is connected by a bar B^1, with a clockwork escapement, the detent of which is alternately retained and liberated by the passage of an electric current, and, by its mechanical force, raises the bar B^1, and causes the light, in whichever lamp it may be, to be put out: the three extinguishers are made to move together, to save the necessity of each being provided with separate extinguishing mechanism. In the interior of the burner of each lamp there is a small ring *a*, of fine platinum wire, which touches the wick of the lamp; and as this platinum ring becomes intensely heated on a current of electricity being made to pass through it, the wick is thereby ignited. The patentee does not restrict himself to the use of platinum wire, as carbon or any other difficultly fusible material may be employed; neither does he limit himself to the use of a ring of any particular form:—the wick may, for instance, be flat, and in that case a straight piece of wire would be substituted for the ring.

The patentee claims, Firstly,—the mode or modes of constructing apparatuses for lighting by electricity, so as to produce a combination of rotary motion with vertical motion, in manner hereinbefore described. Secondly,—the mode or modes of constructing such apparatus, as aforesaid, with mechanism for the purpose of regulating the vertical and rotary motions aforesaid, in manner hereinbefore described. Thirdly, —the use or application of melted sugar, as hereinbefore described, in the manufacturing of carbonaceous compounds, intended to be used in making such electrodes as aforesaid. Fourthly,—the mode or modes of applying or employing currents of electricity to actuate apparatus for effecting the speedy lighting up, or extinction, or obscuration of signal lamps, as hereinbefore described.—[*Inrolled in the Rolls Chapel Office, January,* 1848.]

To WILLIAM CHAMBERLIN, *of St. Leonard's-on-the-Sea, in the county of Sussex, Gent., for improvements in apparatus for recording votes at elections.*—[Sealed 13th June, 1848.]

THIS invention consists in so arranging apparatus that persons having the right to vote at an election may record their votes, without others knowing for which of the candidates such votes are given, and yet, at the same time, the persons giving the votes shall not be able to give to any candidate or candidates more votes than the parties voting are entitled to give.

In Plate XVII., fig. 1, is a plan view of the apparatus, with the cover removed; fig. 2, is a longitudinal section, exhibiting the parts by which the voter is enabled to act upon suitable counting apparatus (not shewn in the drawing, as it does not form part of this invention); and fig. 3, is another longitudinal section, shewing that part of the apparatus which prevents the voter from giving more votes than he is entitled to give. *a, b*, are two knobs or handles, one for each candidate (supposing that there are only two; but if there are more candidates, a corresponding number of knobs, and parts connected therewith, must be employed); these knobs are affixed to sliding-bars *c*, which carry drivers *d*, for acting upon the ratchet-wheels *e, f*, fixed upon the shafts *g, h*; and the shafts *g, h*, are connected with separate counting and registering apparatus, for recording the number of votes given for each candidate. The bars *c*, also carry the drivers *i*, for acting on the ratchet-wheels *j*, fixed upon the shaft *k*, which gives motion to a counting apparatus sufficiently extensive to record the votes of all the persons having a right to vote: this is termed the public index, because its face and pointer are exposed, so that the public may see each vote recorded, and know that the number of votes agree with the number of persons admitted to the apparatus; whilst, on the other hand, the dials and pointers of the counting apparatus connected with the shafts *g, h*, are kept covered or enclosed until the election is over; and then the result is immediately ascertained by uncovering these dials. The ratchet-wheels are prevented from moving backwards by clicks *l*. In each bar *c*, there is a notch *m*, into which a catch *n*, enters, when the bar is pulled out to record a vote, so as to prevent the bar from being again moved by the voter; and to prevent more than one of the bars *c*, from being moved at one time, sliding stops *o*, are applied, which slide in a groove in the bar *p*; these stops are constantly pressed in one direction by a spring or other means; and there is an inclined plane or curve formed at one end of each stop: hence, if one of the knobs *a*, or *b*, be pulled, the lever-stop *q*, upon the bar *c*, belonging thereto, will come against the inclined end of its corresponding stop *o*, and push it endwise, so that it will prevent another bar *c*, from being drawn at the same time; but so soon as the lever-stop *q*, has been moved beyond its sliding-stop *o*, the sliding-stop will assume its proper position; and then any other of the bars *c*, may be drawn out. The bar *c*, which has been drawn out, will be retained until the person who has so recorded his vote has left the room in which the instrument is placed, and then, by the act of closing the door, or otherwise, the bar *r*, will be moved (through the medium of connecting-rods or other suitable apparatus), and will draw the catch *n*, of each bar *c*, out of the notch *m*, and thus permit the bar to be moved back by its spring *s*.

If the apparatus be only intended to record the votes given to two candidates, the parts above described will be sufficient; but when several persons are to be returned from a list of several candidates, it will be desirable to have means of preventing any voter from voting for more than the number of persons to be returned. For this purpose, the patentee employs a cog-wheel *t*, fixed on the shaft *k*, and a sliding-bar *u*, with a rack formed on it, into which the cog-wheel *t*, gears; so that for each movement of the shaft *k*, (produced by pulling one of the bars *c*,) the bar *u*, will be moved forward; and, supposing that only one candidate is to be returned, by introducing a stop or pin u^1, into the first hole in the bar *u*, the machine will be caused to stop after one of the bars *c*, has been pulled out; and the other bars will thus be prevented from moving. If there are several candidates, and two, three, or four candidates to be returned, the stop u^1, must, in the respective cases, be inserted in the second, third, or fourth hole of the bar *s*; and then it will be evident that each voter may give a plumper for one candidate, or he may record his vote for two, three, or four candidates; but he cannot record a vote for more candidates than are to be elected. The bar *u*, like the bars *c*, may be acted upon by the movement of the bar *r*; so that when the bars *c*, are released, the bar *u*, will be lifted sufficiently to withdraw the teeth of its rack from the teeth of the cog-wheel *t*, and permit it to be drawn back by its spring *v*.

To prevent it from being known how many candidates a voter has voted for, there might be an extra bar or bars *c*, with a counting and recording apparatus, which the voter might act on, so as to move the public index to the whole extent of his vote, and yet record his vote for only one or more of several candidates: thus, if there happened to be a person outside who desired to influence the voter, and was watching the public index, he would not be able to ascertain for whom the voter recorded his vote, nor for what number of candidates he voted.

The apparatus, constructed as above described, is to be securely fixed in a room, in such manner that only the knobs or handles to be acted on by the voters shall be accessible by them; and the room should be well lighted, yet not so as to admit of any person looking in to see in what manner any voter records his vote. Each voter is to be admitted separately into the room.

The patentee does not confine himself to the precise details above given, so long as the peculiar character of the invention be retained, whereby mechanical parts are applied in combination with counting or recording apparatus, so as to enable voters to record their votes, and not have it known for whom they voted, and yet be prevented from voting more than once for any candidate, and also from voting for more candidates than are to be returned.—[*Inrolled in the Inrolment Office, December,* 1848.]

To Charles Attwood, *of Walsingham, in the county of Durham, Esq., for a certain improvement or improvements in the manufacture of iron.*—[Sealed 18th April, 1848.]

This invention consists in treating and preparing for smelting, and in afterwards smelting in blast furnaces, such iron ore as, by reason of its being in a more or less broken, comminuted, or pulverulent condition, is liable, if smelted in the ordinary way, without such treatment or preparation, to slip or run down through the fuel to the bottom of the blast furnace, before it has been properly reduced or duly cemented and combined with carbon: the invention is also applicable to the treatment of the kinds of slag or cinder usually smelted for obtaining the iron which they contain, such as forge-cinder, mill-cinder, and finery-cinder.

The mode of effecting these objects is as follows:—The comminuted or pulverulent iron ore or cinder is mixed with the coal required for the purpose of supplying the coke intended to be used in the blast furnace, and the coking of the coal, so mixed with the ore or cinder, is proceeded with in any usual or convenient manner, in order that the ore may become involved in the substance of the coke, and may thereby be rendered unable to so slip through the fuel in the way above mentioned, or to descend through the furnace faster than the coke itself; whilst from being in such close and continuous contact with it, its reduction and cementation become much more complete. But it is necessary to observe, that it is only with such bituminous or caking kinds of coal as agglutinate or run together in the process of burning into coke, that the comminuted ore, slag, or cinder can be mixed, so as to produce the same effect, seeing that they would not adhere to or remain involved in the coke produced by any other sort of coal; and also that in proportion as the coal employed may possess, in a greater degree, such bituminous or caking quality, it is capable of so involving and retaining a greater proportion of such ore, slag, or cinder, and of still preserving in the coke produced the due degree of hardness or strength required for blast furnace use. The patentee remarks, that he has found the kind of bituminous or caking coal which is commonly employed in Northumberland and Durham for making coke, will yield a coke of sufficient strength, when such coal has been mixed with from one-fourth to one-third of its own weight of such iron ore, slag, or cinder, and that, in such proportions, it will produce very good results in the blast furnace; the proportion of coke or fuel, which the mixture in such cases contains, being found capable of reducing, in addition to the ore so mixed with it, as much or as large a burden of iron ore, or slag, or cinder, added thereto in the blast furnaces, in pieces of the size used in the ordinary method of charging, as the weight of coke or fuel contained in such mixture would have done if not so mixed; so that the fuel becomes, by being used as under this new method, improved in the extent of its reducing capability in a very important degree.

With regard to the degree of comminution, or the size of the particles of the small iron ore to which the process may be usefully applied, it is stated to extend from pieces of anywhere about the size of an hen's egg or a large walnut, down to the finest dust or powder; but it is not of much service in regard to lumps or pieces bigger than those above mentioned. And with regard to the size of the pieces or particles of slag or cinder the same rule is applicable; but forasmuch as it is not generally to be met with as consisting in any great proportion of pieces of such small size, it becomes a question of convenience and economy alone, in what circumstances or how far it may be profitable to break it purposely down to such, or near such, size, and to adopt cheap and simple methods of obtaining it in smaller fragments in the process of its production; and forasmuch as such slag or cinder cannot be used in large proportion to the ore employed in the charge or burden of the blast furnace, in the usual mode of working, without injurious effects to the quality of the iron (which do not happen from the use by such usual mode of working of iron ore), such expense and trouble in reducing the size of the slag or cinder, in order to employ it according to the improved method, may be, to a considerable extent, profitable. It is also found advantageous to crush or otherwise reduce the iron ore, in cases where a sufficient supply or proportion of small ore may not be otherwise obtainable. And as, in proportion to the greater specific gravity of the iron ore, or slag, or cinder, employed, it is, in pieces of any given size, more disposed to descend too rapidly through the fuel to the bottom of the furnace, the new process is more beneficially applied to such than to ore or cinder of less specific gravity.

The same proportion of lime or flux will be required for any given quantity of ore or cinder in the blast furnace, where the ore or cinder, which forms the burden of the furnace, may be, in part or altogether, treated according to this invention, as when the customary method is alone employed; but it need not, and indeed had better not, be mixed with the coal previous to coking it, seeing that it would weaken the hardness or strength of the coke, increase the labor, and impede the process of coking without adequate advantage.—[*Inrolled in the Petty Bag Office, October,* 1848.]

To FELIX HYACINTHE FOLLIET LOUIS, *of Southwark, Gent., for an improved method or process of preserving certain animal products.*—[Sealed 26th May, 1848.]

THIS invention consists in preserving cows' milk, goats' milk, and asses' milk, by converting the same into solid cakes or masses, which are soluble in warm water, and may be kept for a long time without losing their original sweetness and freshness.

The milk, in its natural state, is mixed with well-clarified raw sugar, in the proportion of four ounces of sugar to each gallon of milk; and then it is agitated and evaporated by means of the apparatus represented in the margin. Fig. 1, is an elevation of the apparatus, partly in section; and fig. 2, is a horizontal section, taken on the line A, B, of fig. 1. It consists of a series of steam-boxes *a*, connected internally with three hollow standards or steam-pipes *b*; and each steam-box supports an open evaporating-pan *c*, for containing the milk to be operated on. Through the centre of the steam-boxes and pans a vertical shaft *d*, works fluid-tight, carrying a series of agitators *e*, one to each pan, which are caused to travel round and agitate the milk by turning the handle *f*. *g*, is a pipe, furnished with a cock *h*, by which steam is introduced from a boiler into the hollow standards *b*; *i*, is a cock,

Fig: 1.

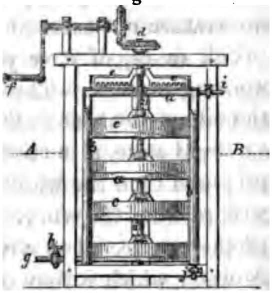
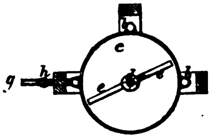


Fig: 2:



through which the steam may be permitted to escape; and *j*, is a cock, for drawing off the water produced by the condensation of the steam. In operating with this apparatus, the pans *c*, are first filled, or nearly so, with milk, sweetened as above described; then by turning the cock *h*, steam is admitted into the standards *b*, and steam-boxes *a*, and kept up to a temperature of from 80° to 90° centigrade (from 176° to 194° Fahrenheit); during which time the agitators are caused to move slowly round by turning the handle *f*. As the process of evaporation proceeds, the milk becomes gradually thicker, and at last it approaches to a solid state: it is then taken out of the pans, and pressed in moulds into cakes of any suitable shape.

When great dispatch is not requisite, the patentee employs a number of shallow pans instead of the above apparatus; into these pans the milk (sweetened as before mentioned) is introduced, to the depth of one-tenth of an inch, and left exposed to the atmosphere until it evaporates to dryness; the solid residuum is then collected and pressed into moulds: if the atmosphere is not in a sufficiently dry state for the operation, the pans may be placed in a drying chamber, kept at a temperature not exceeding 50° centigrade (122° Fahrenheit).

Milk cakes, of a very rich quality, are produced by the following process:—The sweetened milk is heated nearly to the boiling point, and allowed to cool slowly; when it comes to a tepid state, it is curdled by means of rennet or any weak acid; and then the whole is thrown into a sieve, to separate the curd from the whey. The curd is washed with cold water, and then subjected to strong pressure, in order to free it from any water which it may contain; and the whey is evaporated to dryness, in order to recover the salts with which it is charged. The curd is now placed in a pan over a slow fire, and stirred continually; and the salts recovered from the whey are gradually introduced, in small quantities at a time, accompanied by a small portion of bicarbonate of soda, or some other alkali—say one part of alkali to twenty parts of the whey salts. After a time the contents of the pan begin to melt and amalgamate; and, while in this state, a small quantity of gum-dragon, finely pulverized, may be added, in order to facilitate the solidification of the mass.

Cream may be solidified as well as milk by any of the processes above described.

The patentee claims, as his invention, the conversion of milk and cream into solid cakes or masses, by the method or process, and the modifications of the said method or process, above described.—[*Inrolled in the Inrolment Office, November*, 1848.]

To EDWARD HUMPHRYS, *of Holland-street, Surrey, engineer, for certain improvements in steam-engines, and in engines or apparatus for raising, exhausting, and forcing fluids.*—[Sealed 4th January, 1848.]

THE first part of this invention relates to that class of steam-engines known as direct-action engines, and to the application of the same for driving the screw-propellers of ships and other vessels through the medium of multiplying wheels; and it consists in a new arrangement of the parts of such engines, when so applied.

In Plate XVIII., fig. 1, is a side elevation and fig. 2, a plan view of a pair of engines, constructed and arranged according to this part of the invention. *a, a,* are the steam-cylinders, the piston-rods of which are connected by the rods *b, b,* to the pins *c, c,* fixed in the bosses of the large toothed wheels *d, d;* and these wheels gear into and drive the pinions *e, e,* fixed on the shaft *f,* of the screw-propeller. *g, g,* are the air-pumps, which are worked by cranks or excentrics on the shaft *h.* In this arrangement, the driving-wheels *d, d,* occupy the positions usually assigned to the engine-cranks; that is to say, each wheel revolves in a space between a straight line drawn through the centre of the piston-rod of the adjoining cylinder, and a parallel line drawn through the adjoining bearing of the main shaft; and this arrangement admits of the pistons being connected directly to the driving-wheels, instead of through the intervention of cranks, as usual.

The second part of this invention relates to engines or apparatus for raising, exhausting, and forcing fluids, such as the air-pumps of steam-engines, the air-pumps used in connexion with atmospheric railways, &c.; and it consists in the employment of spring-valves, of the kind represented at figs. 3, 4, 5, and 6. Fig. 3, is a plan view and fig. 4, a vertical section of a plate provided with spring-valves. In this plate there are several openings *i*; and each opening is to be covered by a piece of steel or other like flexible metal *j*, about one-sixteenth of an inch thick, fixed at one end to the plate, while the other end is left free; so that, while it yields with the greatest readiness to the pressure of the fluid, it closes instantly upon the cessation of the pressure, without noise or any liability to derangement. Fig. 5, is a vertical section and fig. 6, a plan view of the air-pump bucket of a steam-engine, fitted with spring-valves. In this case the apertures are made in pairs; and each spring-cover *j*, is enlarged at the outer end to a size sufficient to cover one pair of apertures.

The patentee claims, Firstly,—the placing of the driving-wheels, in direct-action marine steam-engines, between a straight line drawn through the centre of the piston-rod, and a parallel line drawn through the adjoining bearing of the main shaft; that is to say, in the space occupied by the crank in ordinary engines;—and also the causing of the pistons to act on the driving-wheel without the intervention of cranks, as above described. Secondly,—the employment in engines and apparatus for raising, exhausting, and forcing fluid, of spring-valves, constructed and acting as above described.—[*Inrolled in the Inrolment Office, July,* 1848.]

To Moses Poole, *of the Bill Office, London, Gent., for improvements in propelling vessels,—being a communication.* —[Sealed 26th May, 1848.]

This invention, which has been communicated to the patentee from abroad by Lieut.-Col. Sir T. Livingston Mitchell, consists in applying an instrument resembling a "bommareng," fixed on a suitable axis, for propelling vessels.

In Plate XVII., fig. 1, is a back view and fig. 2, an edge view of the new propeller. The patentee says, "on observing the motion of the bommareng it is found to describe, in its rotatory movement in the air, a whirl round a hollow centre, leaving a vacant centre of gravity; and it suggested itself to the mind of the said Lieut.-Col. Sir T. Livingston Mitchell that this centre might be in a line, such as *a*, *b*, fig. 1, dividing the two excentric parts, so that they should be together equal in surface to the remaining central portion; and, on experiment, this view was confirmed; and he considers that this will prove to be the best form for the application of the screw principle in propelling vessels." Motion is communicated to the shaft of the propeller from a steam-engine, and the propeller being thereby caused to rotate, acts in the manner of a screw upon the water, and impels the vessel. The blade of the propeller may be set at any desired angle upon the shaft; it may be made with one side convex and the other flat, or with two flat or two convex sides: when it is made with two flat sides, it will be desirable to chamfer off the edges. The propeller may be constructed with more than one blade; but it is considered that one blade will answer better than two or more.—[*Inrolled in the Inrolment Office, November*, 1848.]

To Joshua Procter Westhead, *of Manchester, manufacturer, for improvements in the manufacture of fur into fabrics,—being a communication.*—[Sealed 8th June, 1848.*]

This invention consists in causing the fur of animals to be spun into yarn and then woven into fabrics.

The fur is cleansed, previously to its removal from the skin or pelt, by washing; then the coarser hairs thereof are removed by plucking, as is practised when preparing fur for the manufacture of hats; the fur is next subjected to the operation of "carrotting," which is a process performed by fur-cutters preparatory to felting; after which it is separated from the pelt, either by hand or by machinery, in the ordinary way; and then the fur is subjected to the action of machinery for the purpose of separating the coarser hair from the fine soft hair of the animal. The fur is now saturated with oil or oil and lime-water, in the same manner as when operating upon wool, or it is treated with strong soap-suds; after which it is carded, formed into slubbings or rovings, spun, and woven into fabrics, in the same manner as when wool is being operated upon: the fabrics so made may be finished in the same way as fabrics made of wool.

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* This patent was sealed on the 8th of June, 1848 (although it is stated in the specification that it was granted on the 13th of June); and the specification, which should have been inrolled on or before the 8th of December, was not inrolled until the 13th: the patent, therefore, to be valid, requires *confirmation* by the Privy Council.

The patentee does not make any claim to the processes of slubbing or roving, spinning, and weaving; but what he claims is, the causing fur to be prepared, carded, made into slubbings or rovings, spun, and woven into fabrics; and he also claims the employment of fur, which has been subjected to the process of carrotting, in the manufacture of yarn.—[*Inrolled in the Inrolment Office, December,* 1848.]

To William James Dailey, *of* 1, *and* 2, *Colman's-place, in the parish of Saint Mary, Lambeth, in the county of Surrey, lithographer, for certain improvements in machinery for propelling.*—[Sealed 22nd March, 1848.]

This invention consists in a method of arranging and operating upon the blades or paddles of the propellers or paddle-wheels used for impelling ships, so as to cause the blades to feather or turn on their axes at proper intervals.

In Plate XVIII., fig. 1, is a plan view of a propeller, constructed according to this invention, having part of its casing removed to shew the internal parts; fig. 2, is a vertical section of the propeller, applied in a horizontal position, a little above the keel of the vessel; and fig. 3, is a view of the under side of the plate that carries the guides by which the blades are caused to turn. *a*, is the main shaft of the propeller, on which is fixed a boss *b*; and in this boss numerous recesses are formed to receive the ends of the axes *c*, that carry the propeller-blades c^1. On each axis *c*, are affixed two cross-pieces *d*, of hardened steel, at right angles to each other; which pieces are caused, by the rotation of the main shaft, to travel round in contact with the projections or guides *e*, and

e^1, on the under side of the plate *f*. This plate *f*, forms the lid of the cast-iron box *g*, that encloses the boss *b*, and axes *c*; and in the side of the box *g*, openings are formed, in which the outer ends of the axes *c*, have their bearings.

When the cross-pieces *d*, are travelling over the inclined projection or guide e^1, the blades will assume a horizontal or feathered position; but as soon as the cross-pieces are brought into contact with the other inclined projection or guide *e*, the blades begin to assume a vertical position, and present their broad or propelling surfaces to the water; and they remain in this position until they are again acted on by the inclined projection or guide e^1, by which they are severally turned over into the horizontal or feathered position.

The patentee claims, as his invention, the method of arranging the different parts into a propeller, as shewn, and causing them to revolve in the manner described, when brought into contact with the inclined projections *e*, and e^1.—[*Inrolled in the Inrolment Office, September*, 1848.]

To REAR ADMIRAL SIR HENRY HART, *Commissioner of Greenwich Hospital, for improvements in apparatus for preventing what are called smoky chimneys.*—[Sealed 13th June, 1848.]

THIS invention consists in the employment of a wheel, put in motion by the wind, for the purpose of causing the air to be withdrawn from a chimney or flue; such wheel being made to assume the most suitable position for being acted on by the wind by means of a vane or arrow.

In Plate XVIII., fig. 1, is a vertical section of a metal chimney-pot, with a wheel applied thereto, according to this invention. *a*, is the wheel, which is made with a series of blades or floats, similar to a rotary fan, and turns on a horizontal axis *b*; this axis is supported by the upper part *c*, of the chimney-pot, which is capable of moving round freely upon the lower part c^1; part of the wheel rises above the chimney-pot, so that the wind, acting on the upper floats, will cause the wheel to rotate in the direction indicated by the arrow, and thereby withdraw the air and gaseous vapours from the chimney. The wheel is brought into the proper position to be rotated by the action of the wind upon the broad or tail part of the vane or arrow *d*, which is fixed on the top of the moveable part *c*, of the chimney-pot. *e*, is a shield or guard, to prevent the wind being forced down the chimney.

Fig. 2, is a vertical section of a chimney-pot, with a wheel applied thereto in a different manner to that shewn at fig. 1. The wheel works in an opening made in the side of the part *c*; and the upper part of the wheel is covered: the wind acts on the under part of the wheel, and drives it round, as indicated by the arrow. *f*, is a top plate, to prevent down-drafts when the chimney is in a low position, surrounded by higher buildings.

Fig. 3, exhibits another modification of the apparatus, in which the wind acts on the upper part of the wheel. The patentee states, that when there is no fire, the action of the apparatus will tend to maintain an upward draft in the chimney, and thus ventilate the apartment with which the chimney communicates. If it should be found requisite, a ratchet-wheel may be fixed on the axis of the wheel *a*, and a click used to prevent the wheel from turning in the wrong direction.

The patentee claims, as his invention, the employment of a wheel, put in motion by the wind, so as to cause the air to be withdrawn from a chimney or flue; the wheel being caused to move into position by a vane or arrow.—[*Inrolled in the Inrolment Office, December,* 1848.]

To DEANE SAMUEL WALKER, *of London-bridge, merchant, for improvements in the manufacture of bands or straps for hats, caps, shoes, and stocks.*—[Sealed 24th June, 1848.*]

THE first part of this invention consists in manufacturing bands for making the bodies of hats, and for covering the bodies of hats, by that method of weaving which is termed tubular or circular weaving. For making the bodies, the patentee prefers to form the bands of looped fabrics by tubular or circular weaving; as such fabrics admit of the body of a hat being shaped with more facility than the tubular fabrics woven with warp and weft. The band of tubular fabric is stiffened and used in the same manner as when other fabrics are employed for making hat bodies; a crown, either of looped fabric or other material, is affixed to the body; and a brim is applied as heretofore;—the difference in the manufacture consisting in using a band of fabric produced by tubular weaving for the body, whereby all seams or joints are avoided. For covering hat bodies, the patentee employs bands of tubular weaving, either consisting of looped fabric or of fabric woven with warp and weft; and the same may have a pile or not, according to the appearance desired to be obtained. The covering is cemented to the body in the same manner as the fabrics commonly used for covering hat bobodies; and the crown and brim are covered as heretofore.

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* By a memorandum of alteration, dated December 23rd, 1848, the patentee has disclaimed the words "or straps," and "caps, shoes, and stocks," from the title of his patent.

The second part of the invention consists in certain modes of making mourning hat bands. The first mode consists in employing the process of loop weaving for making tubular bands of wool, silk, or other fibrous materials; and such bands may have a pile raised or not:—the tubular weaving produces elastic fabrics which may be readily pulled over the crown of a hat, and will securely embrace the body of the hat; and it is the making of mourning hat bands of cylindrical or tubular looped fabrics which constitutes the peculiarity of this part of the invention.

The second mode of manufacturing mourning hat bands consists in applying a thin coating of India-rubber to the inner surface of hat bands, in order to impart a greater degree of elasticity to the fabrics of which such bands are made than they would otherwise possess. The patentee prefers to make the band of fine woollen cloth, cut on the cross; but other fabrics may be used. He spreads a thin coat of India-rubber on that surface of the band which will be placed next to the hat; and he joins the ends of the band by cementing the same with India-rubber or other suitable cement—preferring first to join the ends by sewing, then to cover the parts folded down with India-rubber or other suitable cement, and to cover the back of the joint or seam by cementing a piece of tape or other fabric over the seam:—this mode of forming a seam, whether the same be sewed first or not, constitutes one of the novelties of this part of the invention; and it is applicable for joining the ends of mourning hat bands, whether the same be coated at the back with India-rubber or not.

The third mode of making mourning hat bands consists in applying India-rubber bands coated over with flock. A thin sheet of India-rubber is coated with cement, and flock is sifted over it; and then the sheet is cut into bands and the ends cemented together. Or the India-rubber may be first made into bands and then coated with flock.—[*Inrolled in the Inrolment Office, December,* 1848.]

To Joshua Cooch, *of Harleston, in the county of Northampton, agricultural implement maker, for improvements in sack-holders.*—[Sealed 10th August, 1848.]

The patentee commences his specification by stating, that an apparatus, termed a sack-holder,* is now in use, whereby the sack is held up whilst being filled; but such apparatus does not facilitate the operation of moving the sack, when filled, from one place to another. This invention consists in adding to, or combining with, such apparatus, the means of promptly and expeditiously moving the same, with the sack upon it, from the place where the sack is filled to the place where its contents are to be discharged.

In Plate XVIII., fig. 1, exhibits an elevation of a sack-holder, combined with a two-wheeled carriage,—by means of which it can be readily moved from one place to another; fig. 2, is a plan view of the carriage; fig. 3, represents a side view of the sack-holder, as it would appear when being moved; and fig. 4, represents the sack-holder in the proper position for holding a sack while the same is being filled. *a*, is the frame or carriage, which is mounted on two wheels *b*, *b*, and is provided with a stirrup or seat a^1, whereon the bottom of the sack rests,—a hook or catch a^2, to receive the foot of the diagonal frame *c*,—and two bearers or supporters a^3, a^3, to which the lower ends of the legs or standards *d*, *d*, of the sack-holder are to be attached. When the sack has been filled, it is necessary to place the frame of the sack-holder in an upright position (or nearly so), and then the foot of the frame *c*, will drop into the hook or catch a^2, where it will remain while the apparatus is being wheeled from place to place, in the manner indicated by fig. 3. In order to bring the sack-holder into the proper position for holding the sack while it is being filled, it is necessary first to cause it to assume an upright position, when the foot of the frame *c*, will be thereby released from the hook or catch a^2, and it is then to be extended in the manner shewn at fig. 4.

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* A patent was obtained for this apparatus by Mr. H. Gilbert, on the 27th May, 1847; and a description of the invention is given at p. 26, Vol. XXXII., Conjoined Series.

The patentee claims, as his invention, the construction of a sack-holder with wheels or rollers, or other equivalent means of moving the same from place to place, as above described.—[*Inrolled in the Inrolment Office, November,* 1848.]

To Edward Barker, *of Budleigh Salterton, in the county of Devon, Gent., for his invention of certain improvements in the preparation of manure.*—[Sealed 26th October, 1847.]

This invention consists in combining certain animal, vegetable, and mineral materials, in certain proportions, and in submitting these combinations to the action of fire, for the production of a compost or manure, suitable, under some slight variations of proportions or quantities, to almost every nature of soil, and to every variety of vegetation.

The patentee has described two processes; the first of which consists in placing in a reverberatory or other suitable furnace the following materials, viz., sea-coral, coralline, sea or land-shells, sulphate or phosphate of lime, or any substance or substances containing lime and requiring disintegration, or a mixture of any two or more of these substances; and to every one hundred parts, by weight, of either of these substances, or of a mixture of any two or more of them, or of so much of the chemical constituents of each as may be necessary for the formation of one hundred parts, by weight, of any two or more of these substances, from fifty to one hundred parts, by weight, of common salt are added. These materials are to be heated with any vegetable substance capable of affording either potass or soda, or with any other combination or material containing either potass or soda, in what way soever applied, until the disintegration of the particles of the coral, coralline, land or sea-shells, or other similar substances, can be effected by slight mechanical pressure or attrition; fifty parts of these last described materials, prepared as above specified, are then added to one hundred parts, by weight, of fish or of any land or marine animal organic substance, with or without the admixture of land or marine vegetables, or of night-soil; and they are mixed well together in a boiler with urine, sea-water, or gas-liquor;—the escape of ammonia being prevented by the addition of an acid, or of any salt whose acid constituent possesses a greater affinity for ammonia than the base or bases with which it may be united. The whole is then boiled under agitation, until it becomes dry or nearly dry, and, during the process, as much silex or silicate of potassa, soda, or lime, as may be required by the specific nature of the soil on which the compost is intended to be used, and by the quality of the vegetable about to be grown, is added to the mixture.

By the second process, fish or any marine animal organic substance or substances, with or without an admixture of marine vegetables, is combined with night-soil, in the proportions of from ten to twenty parts, by weight, of the latter to one hundred parts, more or less, by weight, of the former matters; or, in place of the night-soil, ten parts, by weight, of bones, previously mixed with diluted sulphuric acid, so that they shall be converted to a soft state, are added; and these materials are mixed with from ten to twenty parts, by weight, of soot. So many of the materials in combination as may be deemed necessary are, in the proportions above mentioned, placed in a boiler, or in any other convenient receptacle, with urine, or sea-water, or gas-water; and a sufficient quantity of either of these fluids, or of a mixture of any or all of them, is added, to allow of the materials being boiled and perfectly mixed together; the mixture is then heated and kept stirred until it is thoroughly incorporated and become dry or nearly so;—care must, however, be taken, to prevent the escape of ammonia, by the means proposed in process No. 1, or by any other suitable means. When required, the results of process No. 1, and of process No. 2, may be mixed, in various proportions, to suit specific purposes.

The patentee claims the disintegration of coral, coralline, shells, or other lime-salts, by operating thereon, in combination with common salt, and soda, and potass, or their constituents, by means of heat, as above described, and for the purposes above set forth; also combining the materials (so prepared) with other ingredients, in the manner above described, for the purpose of producing an improved manure or compost, adapted to almost every variety of soil, and to every variety of crop.—[*Inrolled in the Petty Bag Office, April,* 1848.]

To THOMAS DALTON, *of Coventry, silk dyer, for improvements in the manufacture of fringes, gymps, and bullions.* —[Sealed 8th June, 1848.]

THIS invention consists, firstly, in printing fringes made of silk twist or sewings, and fringes made of linen, and in printing silk gymps; and secondly, in a mode of making fringes and bullion by applying printed silk twist or linen sewings in such manufactures.

In manufacturing fringes, it is usual to weave them in looms, with sufficient warp for making two selvages, at a distance apart equal to the width of the two pieces of fringe; and the weft of silk (twist or sewings) is thrown across, and produces two woven selvages or heads for two pieces of fringe: the fabric thus made forms two widths of fringe, when cut in a line parallel with, but intermediate of, the selvages. The first part of the invention can be applied with most advantage before this operation of cutting the weft (which forms the open unwoven fringe parts of the fabric) is performed, because the whole fabric may be more readily spread on a table or other suitable surface, and printed with hand-block or other suitable printing surfaces;—the two selvages facilitating the stretching of the fabric in the direction of its width as well as of its length. After the fabrics have been thus printed or prepared for discharging color, they are to be finished and treated in the ordinary manner, as if the printing had been performed on other woven fabrics of silk. It is not essential to this part of the invention that the process of printing the fringes should be performed before the weft is cut. On the contrary, it will be desirable, in some cases, to divide the weft or fringe part of the fabric before printing the same; particularly in cases where two pieces are to be printed with different patterns or colors. In such cases it will be desirable to employ several warp threads at that part where the two pieces are to be divided, and to form the same, by the introduction of the weft, into a fabric, in like manner to the selvages or heads, and then to cut the two pieces of fringe apart by dividing this stripe of woven fabric. By this means the unwoven portions of the weft of each piece of fringe will still be held even and regular (the cut woven portion acting as a selvage, to facilitate the operation of spreading out and keeping the fringe even during the printing process); and when the printing has been completed, the extra woven portion may be cut away, leaving the fringe complete.

The other part of this head of the invention consists in taking silk gymps, made in the ordinary way, laying the same on a printing table or surface, and printing them: they are then to be steamed and finished in the same manner as other silk fabrics are treated after printing.

With regard to the second head of the invention, the patentee remarks that warps of silk have heretofore been printed; and it has been proposed to print weft; but he is not aware that the same has ever been brought into practice. He mentions these circumstances in order to state that although this part of this invention consists in employing printed silk twist or sewings as weft in the manufacture of fringes and bullion, yet he does not claim the process of printing weft, but the application thereof in this branch of manufactures; and he uses such printed weft in the same manner as unprinted weft has been heretofore used. By this means he produces a new manufacture of silk fringes and bullion with printed designs thereon having a mottled appearance, or with more or less regular designs.

The patentee claims, Firstly,—the mode of manufacturing fringes made of silk twist or sewings of linen, and also when made of linen, by printing them with patterns after weaving, as above described; and also the printing of silk gymps with patterns. Secondly,—the application of printed silk twist or sewings, as weft, in the manufacture of fringes and bullion. —[*Inrolled in the Inrolment Office, December,* 1848.]

Scientific Notices.

ON THE POWER OF GOVERNMENT TO FOSTER NATIONAL INDUSTRY.

Of all the characteristics which go to the formation of the human intelligence, perhaps there is not one which commands such universal respect as Forethought, for, without that quality, nothing great or noble can be achieved; and yet forethought is of itself a mere helper, a crutch as it were, by which poor limping human nature is enabled to push forward in its toilsome journey, and attain its desired ends. Without it we have only the chapter of accidents to trust to; and failure, however great may be our aims, is almost sure to follow. This is a matter that should obtain more consideration than it has yet received from the political and social reformers of the present age; for, however confident they may be of the greatness and goodness of their aims, they may rest assured that obstacles will present themselves for removal before anything of moment can be achieved. It is not then sufficient that the foremost men of our day should have at heart the accomplishment of what we have, in a former paper, defined as the perfection of all human exertions, viz., *the destiny of mankind,* there is yet another essential for the attainment of a positive and permanent advance, and that is, certainly—forethought. We may trace the growth of science, and perceive, with satisfaction, our growing power of command over the winds and waves,—we may pierce through the mysteries which enshroud the movements of the planetary bodies,—we may discover the principles of gravitation, and, by an unprecedented development of scientific skill, we may, even through a tempororary local inversion of the influence of gravitation, gain the power of conferring aerial lightness upon ponderous bodies; and yet, by neglecting the patient exercise of forethought, we should jeopardise the possession of such attainments, and, as a people, we might possibly fall back into barbarism. It was far enough from the thoughts of the great men of France when they were pouring adulations upon the young astronomer, whose profound researches seemed to have placed his country foremost in the rank of civilization, that the very city wherein his great discovery was so extolled, would so soon have become the scene of intestine slaughter, and have run the imminent hazard of falling a prey to the hands of men who would, if they were able, have swept out science from the land, and begun a nomade life of helpless imbecility. Forethought, which might have found the means for holding prisoner such discordant elements, or crushing them in the bud, is therefore not merely necessary for pursuing researches which may lead to the development of science, but also for securing the advances thus attained.

Now, although the exercise of thought, of any kind, is too little congenial to the tastes of the great mass of mankind, yet we cannot altogether agree with those moralists, who have asserted that men in general would rather endure bodily torture than bend their will to the exercise of reflection.* It is, however, the bounden duty of those commanding spirits—those political Curtiuses, who, for the good of their country, are ever ready to leap into any chasm which circumstances may have created in the machinery of government, and, by a personal sacrifice, to fill up the void,—it is, we say, the duty of such men to follow events with a penetrating eye, and ponder well over the probable results which every important advance in practical science is likely to produce through the ramifications of society, and that with the earnest desire of anticipating or removing any disorganisation or inconvenience that might thereby arise.

We have, on several previous occasions, alluded to this subject, and have offered some few suggestions, which, if carried out, might tend, in some degree, to restore a regularity of demand for our industrial products, and ensure a corresponding supply; we have also urged the expediency of unfettering industry as much as possible, so that when, by some new application of mechanical or chemical science, any branch of manufacture may have been superceded or modified to a degree sufficient to release workmen from their ordinary employment, all facilities might then be given for turning their labor to profitable account in another direction; but, beyond these suggestions, which we admit would rather from their indirect than direct effects advance industrial organisation, we have not ventured. Our aim has been to shew, that not only must the inventor have a fair field for his exertions, unfettered by legislative enactments, and free from the intimidation of recusant workmen, but that it is the duty of government to provide the means, at least indirectly, if not directly, whereby the surplus labor of the country may, from time to time, be absorbed and beneficially applied; instead of allowing the odium of disorganising industry to fall upon the inventor, whose discoveries, when at first applied, will perhaps disturb the labor market, but will, in many cases, tend eventually to re-arrange it on a firmer basis.

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* In Coleridge's "Aids to Reflection," we have the following passage in allusion to the followers of the Brahman superstitions:—"But, alas! to swing by hooks passed through the back, or to walk in shoes with nails of iron pointed upwards through the soles—all this is so much less difficult, demands so much less exertion of the will, than to reflect, and by reflection to gain knowledge and tranquillity."

It is, perhaps, difficult to overrate the power which a firm and wise government possesses of conferring prosperity on the country whose destinies it sways. A tolerable notion of the extent of this as yet partially-applied influence, may be gathered from contemplating the extensive results which the exertions of one enterprising individual, provided with but limited means, has so frequently effected. Many have been the instances, in our time, of men, who, by their unaided energies, have drawn around them a contented and industrious community; and thus, by providing an opportunity for the remuneration of honest labor, have either broken up the haunts of misery and crime, or prevented their formation. When we see such happy results proceeding from the acts of men whose position necessarily confines their exertions to a small locality, we may well conceive the power which a popular government might wield where the field for action is not upon a comparatively few individuals, but upon whole nations. If we were to ask why English manufactures are, in so large a measure, excluded from the continent, we might be told, that the prohibition arose from jealousy of our national prosperity—from a covetous desire to realize the profits which our manufactures would otherwise receive—or from justice to the home manufacturer; but these, and many other reasons of a like kind, are all demonstrable as fallacious, the system being as pernicious to the countries which exclude our goods as to ourselves; and the removal of such prejudices ought, therefore, to have been a prominent feature in our foreign diplomacy. Within the present century we might, by a word, have thus far controlled all the nations of Europe; and we should thereby have received somewhat of an equivalent for the blood and treasure expended in the continental wars; but, from want of forethought, this opportunity has been lost; and, even to the present time, the mushroom governments of Spain and Portugal are allowed to employ the power which, but for the countenance of England, they would not have possessed, to the exclusion of British manufactures,—although those countries, if put up to auction, like the Roman Empire in the days of its decline, would not fetch a tithe of the sum which England has lavished for their independence.

But, as our government has systematically shrunk back from the task of providing foreign markets for our manufactured products, agitation has been resorted to to force it into activity;

thus the bill for corn-law repeal was thrust upon the legislature with the hope of extending the demand for our goods by an exchange of foreign grain: a disappointment in the expectations of the promulgators of this measure has only created a zest for a new project, which is intended to produce an increased demand for home consumption. If, from the cry which is now being raised for a paper currency, any rash project should be forced upon government, under the impression that prosperity will revive by its adoption, the ill-effects of such legislation must be looked upon as the result of a neglect of forethought in providing a suitable vent for the productions of industry; for it is only from the depressed state of our commercial and manufacturing community that this project has taken root, and is, as we believe, daily gaining ground. To those who have been used to look upon their possessions as valuable only in proportion to the amount of sterling coin they would produce, the introduction of a paper currency must appear a mere chimera; while to such as have drawn their notions of the subject from sketchy notices of modern history, it must seem as a gratuitous acknowledgment of national bankruptcy,—it having hitherto been the last resource of insolvent nations.

Whether or not it is possible to devise a healthy system of paper money, which, while it promotes a free exchange of commodities, will prevent the excess of foolish speculation—that poison-fruit of evanescent prosperity, so frequently rising and spreading, like an epidemic, to entail only misery on its victims—is scarcely within our province to enquire, for our view should be confined to the consideration of the *use* merely, and not the abuse of remedial measures, for the unshackling of our national industry. The power which the mercantile classes now possess of carrying out a crotchet, which is deemed beneficial to their class, can no longer be doubted; and it behoves government, not merely for its own dignity, but for the general interests of the country, to take the initiative, and, by a prudent exercise of forethought, to predetermine what shall be done for the coming exigencies of the state. When compulsion is the lever that works reforms, we may well doubt the wholesomeness of such alterations; but when the members of government, who, from their position, have access to all kinds of information, determine, in calm deliberation upon honestly prepared data, on a project which they believe will advantage the country, there may be some hope of success from such legislation. This mode of proceeding is, however, seldom adopted: to shut their eyes to evidence which is apparently fairly given, is too often the case, and argues a carelessness little short of culpable negligence. The opinions which were recently collected from competent authorities on the subject of the currency, is a case in point. This inquiry, it will [illegible] remembered, was; in a measure, forced upon the legislature; [illegible] the disinclination of the great majority of the members to [illegible] it is proved by the silence of government on the subject, although the evidence adduced was in great part to this effect—"The means of getting back the gold (after it has left the country) is by making money dear, and causing a fall generally in the prices of commodities, which will bring back gold." Now, without an explanation, any reasonable man may, from this quotation, infer, that manufactured goods, for instance, although possessing an intrinsic value, since they are to supply a necessity, must be sold at a sacrifice, to cause a return of a commodity, which, except for destructive use (that is, as a raw material for the manufacturer to work up, and for which purposes there is comparatively a small demand) has only a fictitious value. This, we say, is what might be fairly inferred; but if, through a deficiency of gold (which, as a circulating medium, is merely a symbol of real wealth, although custom has given it an extensive appreciation), the productions of industry are reduced in value to a degree which defrauds the workman of an equivalent for his labor, and cripples the manufacturer and the merchant in their enterprises, there must result a large amount of positive injury to be set against the good which is presumed to flow into the country with a return of the precious metal. The relative proportions of the two opposing elements should certainly have been ascertained before the inquiry was dropped, in order that a balance on one side or the other might be struck; but, instead thereof, the public mind is kept without an elucidation of the problem, and is allowed to run riot amongst the propounded schemes of a thousand theorists, of various degrees of badness,—from the one which requires only a ream or two of paper and the services of a journeyman printer for the discharge of the national debt, to the last new Herculean project, which, as a kind of cross breed between the institution of the Bank of England and the Spanish Inquisition, is to consist of a National Paper-Issue Loan Office, of a nature somewhat resembling the India-rubber tree, whose exudations are of so elastic a character as to be capable of any degree of extension, and, when prepared for general use, will allow of their happy possessor weathering all storms. This notable scheme, which has for its author a Mr. Gray, must be the very *beau idéal* of the philanthropist's desires; for it is warranted to "annihilate almost every evil with which this country is afflicted," the means being simply to issue paper money, through a national bank, to any extent that shall not exceed the total value of all commodities contained in the shops and warehouses of the country. By this arrangement, the manufacturer or dealer can pawn his whole stock, which is put under a ban, as regards the original owner, and the profits realized from the final sale of the goods are transferred to a national fund. How the author of this project could so far have deluded himself, with respect to its value, as to offer a reward to any person who would refute its practicability, is somewhat of a puzzle; but there are other plans, which, from their apparent reasonableness, may, if paper currency is essentially bad, be more hurtful, inasmuch as the public mind is now awakened to the subject, and is ready to seize upon any tangible scheme. If, therefore, our monetary system, as at present constituted, is the only sure basis for healthy commercial transactions, it would have been well, in the last sessions of parliament, when the matter was under discussion, to have quieted the paper currency proselytes with reasons instead of ridicule; for thereby the public might have been enlightened and saved from the risk of aiding rash enthusiasts in breaking down our barriers of commercial stability. On the other hand, if the present system is untenable, when examined by the light of reason, it behoves government, by the exercise of that forethought which has been heretofore so little employed, to be prepared with a judicious proposal for the amelioration of those hardships which a limited and unexpansible currency is said to entail, in order that any further depression of industry may not be made the pretext, by political quacks, of saddling the country with a nostrum that will be worse than the disease.

ON THE MANUFACTURE OF SAFETY-PAPER.

THE manufacture of a safety-paper is of considerable importance in a financial and commercial point of view. A means of protecting commercial and other documents against forgery has long been sought after. Such progress has been made in engraving, lithography, photography, and chemistry, that, supposing forgers to be in possession of all the secrets of science, society would have no protection against their devices; but happily these secrets are in a measure kept sealed against those who would make so dangerous a use of them; and, moreover, the efforts of the initiated are constantly directed to the frustation of the plans of such men. This honorable warfare would now appear to be triumphantly terminated, if we may rely upon a work which has just been submitted to the Academy of Sciences by M. Dumas, in the name of a Commission, of which MM. Thénard, Pelouze, and Regnault, were the members.

We may add that this interesting communication has evidently been brought about through M. Seguier, who had, at a former sitting, given very unfavorable information respecting paper money, which, as it is at present, or has been hitherto made, may be easily counterfeited; but by means of the novel processes and safety-paper, which has just been approved of by the Institute, counterfeit would be impossible, so that we may be led to hope that the crime of forgery will one day disappear from the penal code.

M. Dumas' communication regarding safety-paper is as follows: we give it entire on account of its importance:—

The undersigned members of the Commission of Safety-Paper and Ink, persuaded from long study that the question proposed to them by the Academy has at length been solved, conceive it to be their duty to put the Academy in possession of the results obtained, and to submit to them the conclusions arrived at.

Having been called upon to form part of the government Commission charged with this subject, they have been enabled to follow, step by step, and day by day, the progress made in the solution of this question by the skilful persons successively employed upon it. To overcome the difficulties by which they were surrounded, they spared no trouble, but kept in view the necessity of maintaining, in all its purity, notwithstanding the practical difficulties attending it, the fundamental principle which had been sanctioned by the Academy upwards of ten years ago.

The Academy will doubtless learn with interest that not only have all the obstacles which stood in the way of the application of the process which appeared to be the best, been overcome, but that experience has also shewn this process to be the only one which offered the desired protection. The work has been long and arduous, for by a letter, dated 13th February, 1826, the Minister of Justice consulted the Academy on the means which might be employed by government for the purpose of preventing the serious consequences resulting from the forgery of public or private documents, and of preserving the public treasury from the fraudulent erasure of writings upon stamped papers.

After lengthened researches, the Commission charged with the examination of this important and delicate question, made known in a report, dated June 6th, 1831, two methods of rendering the fraudulent erasure of writing impracticable; one of which, at least, might offer great obstacles to the commission of forgery.

The Academy, adopting the views of the Commission, proposed to the government to prescribe or to advise the employment of an indelible ink, which should resist all attempts at forgery, by erasure or other means. This ink, which may be obtained at a very moderate price, and is made by diluting Indian ink with water, acidulated by means of hydrochloric acid, in such quantity as to give it a density of 1,010, resists, in fact, very well, all chemical agents, and even mechanical erasure, providing the ink has sufficiently penetrated the paper. Seeing, however, the difficulty of making the generality of persons who have occasion to use stamped paper employ a particular kind of ink, the Academy advised a device to be printed with ordinary ink in the middle of each stamped sheet, which would disappear on any attempt being made to efface the writing, in order to use the paper over again.

These propositions became the subject of attentive consideration on the part of government—as to whether they should be carried into effect.—A well-executed work, addressed, on the 18th July, 1836, to the Minister of Finances by M. de Colmont, Inspector of Finance, and M. Cordier, Inspector of Domains, shows that the device in delible ink, proposed by the Academy, may be easily applied, either by means of a block engraved in relief, or by the ordinary typographical characters.

At about the same period the government and the Academy were taken with the idea of using a paper the pulp of which should contain invisible re-agents, but which should be susceptible to the action of the agents affecting the ink, and be thereby changed in color. Another plan was also proposed, which consisted in forming each sheet of paper of two thin sheets, and placing between them a device printed in ordinary ink, which would be effaced by the same agents employed to take out the ink.

Two reports adopted by the Academy in 1837, made known to government and to the public the results of the further researches of the Commission in these various plans. The paper impregnated with chemical re-agents did not meet with their approbation; most of them, both those at first and recently proposed, contain cyanoferrurets, and acquire therefrom many remarkable qualities with regard to sensitiveness to the re-agents ordinarily employed for effacing and forging writings; but when the cyanoferrurets are insoluble, it would not be impossible to find agents capable of effacing ink without changing the color of the secret test in the paper. When the cyanoferrurets are soluble, the sensitive material may always be removed before effacing the writing, and again introduced into the paper after effacing or altering the writing.

Besides, as it is possible that a re-agent introduced into the paper will, under the influence of the atmosphere more or less damp, cause a slow action, which would, in a few years, affect it considerably, it would be necessary, before advising the adoption of any one of them, to ascertain, by long experience, that it is really free from all injurious properties in this respect. Lastly,—cyanoferrurets, which constitute the most sensitive and consequently the most efficacious re-agents, increase (even when small quantities are used) the combustibility of the paper; sometimes even to such an extent that it will burn like tinder.

For these reasons the Commission rejected the employment of this kind of paper in 1837; since which time, notwithstanding the numerous and most persevering attempts which have been made, none of the persons experimenting on this plan have succeeded in meeting the serious objections just mentioned.

About the same time the double sheets, furnished with a delible internal device, were rejected, as it was found that these sheets might either become detached spontaneously, or might be very easily separated intentionally. It had also been proved that the writing could be effaced without effecting the interior device.—These kinds of papers had been counterfeited with ease by means of the ordinary lithographic processes.

Lastly, the Commission did not find, in the mode of manufacturing such papers, the degree of durability requisite for stamped paper. This paper, with interior devices, has, however, been advantageously employed by companies and commercial houses; to whom this latter consideration is of no moment, and to whom it matters but little whether the paper they use was manufactured by hand or by machinery, or prepared with vegetable or animal gelatine,—to what degree it was sized, and whether it was durable or not. When made thin, and but slightly sized, this paper takes up the ink freely, and renders forgery more difficult. It is not, however, applicable to the manufacture of paper to be stamped, as the government very justly prefer using stiff hand-made paper, sized with gelatine, and of a durable nature, so that deeds written thereon may be kept for many years.

The researches of the Commission, nominated by the Academy, have coincided in a transformation which took place in the art of manufacturing paper; and this circumstance gave rise to an apparent contradiction between the conclusions to which they were led in their first report and those which arose from the subsequent reports. This may be easily accounted for:—At the time when the first report of the Commission was adopted by the Academy, the paper used in commerce was principally hand-made, and sized with gelatine;—on this paper acidulated Indian ink will sink very deep, and produce indelible marks; the Academy was therefore perfectly justified in recommending its use.—But, in a short time, paper made by machinery and sized with fecula and resin monopolized the market, by reason of its low price; and it is at present almost the only sort in use. Acidulated Indian ink is not very readily absorbed by this kind of paper, and consequently characters written upon it may be easily effaced by washing or by mechanical means, although perfectly unattackable by chemical agents. It was attempted to substitute alkaline liquor for the acid used for diluting the Indian ink, but with no better success, as, on being tried in one of the government offices, neither of these were found to possess any advantages over ordinary ink.—Thus, in consequence of the change in the mode of manufacturing paper, the use of indelible ink was abandoned.

It now remained to discover the means of security required by the public and by government itself, in the use of an exterior delible device, which appears to have been hitherto the only practicable plan. Such was, in fact, the object proposed at a meeting convened by M. Lacave Laplagne, when Minister of Finance, who has invariably made a point of endeavouring, as far as in him lay, to meet the views of the Assembly. On this occasion the results obtained by M. M. Zuber, Knecht, and De Bourges, were very well received; but the commission decided that the desired end was not fully attained, at least as far as they could judge, by the papers presented at the appointed time of meeting.

During the interval, however, which elapsed between the despatch sent by the Minister of Finance to the Academy, and the work of M. M. Colmont and Cordier, a considerable and important modification of one of the propositions of the Academy had been attempted by M. Grimpé, who did not think it necessary to present himself at the above-mentioned meeting. This clever artist, taking up the idea of the Academy, sought to obtain the desired end (viz., the prevention of forgery, either by altering the writing or effacing it altogether,) by means of a delible device. For this purpose he endeavoured to produce a microscopic device, which, extending all over the surface of the paper, and composed of lines too fine to be reproduced by hand, and which being printed with delible ink, should be open to attack by all the agents which affected writing, and when once effaced, could not be restorable by the most skilful hand, or by any printing process.

M. Grimpé's first experiments obtained the entire approbation of the Commission; and this was shown to be founded upon sound judgment by the failure of all subsequent attempts.

We do not mean to say that no improvement has been made upon M. Grimpé's plan, as it was first proposed by him. On the contrary, taking advantage of all the observations and advice offered him, he has successively improved upon, and sometimes even entirely altered, the details or means of execution; but although by these means a product has been obtained more in accordance with the exigencies of the public and the government, together with the conditions of regular and economical manufacture, the principle of the system remains the same.

The principle consists in covering the paper with a microscopic device, printed on both sides with delible ink, by means of a cylinder. The nature of the device, the mode of engraving the cylinder, the nature of the ink and of the paper, have, during the last eleven years, been the object of incessant discussion and study on the part of some of the members of the Commission, the importance of which will be easily understood.

Fine lines, capable of being reprinted upon paper, may be traced upon a plane or cylindrical surface, either by an engine-turning lathe, or other suitable means, such as a steel roller having the device upon it in relief, and which by strong pressure may be reproduced in intaglio upon a copper cylinder. This latter process is the one adopted by M. Grimpé. From an experience of eleven years your Commission is confirmed in its previous opinion.

After having successively tried various geometric figures as suitable for composing the device, such as concentric circles, hexagons, &c., all opinions were in favor of the microscopic stars, which are upon the papers submitted to the Academy. This device has been found to present insurmountable obstacles to its reproduction by hand. With regard to the absolute identity of these stars to one another, we will merely observe that they are produced by a single steel punch or die, upon which a single star is engraved. This punch, which is very highly tempered, is caused to stamp the stars all over a soft steel cylinder, which is then tempered, and by being made to act with great pressure upon other untempered cylinders, the device may be reproduced upon any number of them; these cylinders may then also be tempered, and may be made to reproduce the device upon copper cylinders, from which they may be printed on the paper.

In M. Grimpé's first experiments the cylinders intended for printing from were engraved in intaglio, but they are now engraved in relief. This difference, although slight in appearance, is deserving of special notice, as the results produced thereby are very important.

Your Commission has always endeavoured to maintain as a principle, that a device for a safety-paper must be of such a nature as to be incapable of being imitated, and traced by hand with ordinary ink; so that on any attempt being made to alter the writing, the device must also be altered, which would be apparent from the impossibility of restoring that part of the device which had been destroyed. Now the numerous experiments which have been made upon safety-paper, have established as a favorable condition the following principle, which will no doubt be very important in its applications, viz., that a very fine device cannot be printed with aqueous or ordinary ink unless from an engraving in relief. If a very fine device is required to be printed from intaglio engravings, printing or lithographic ink must be used. Judging from the above experiments, however, and some specimens printed by M. Didot, it is evident that ordinary ink may be used for printing from engravings in relief.

As long as M. Grimpé made use of cylinders engraved in intaglio, he found it necessary to employ indelible ink thickened by varnish, and consequently differing, at least in that respect, from common writing ink. Since he has made use of an engraving in relief, he has been able to print with ordinary ink with the greatest facility. The conditions established by the Commission have therefore been complied with.

Some members of your Commission, after mature deliberation, thought proper to advise the stamp department to persevere in the employment of paper made by hand, a sheet at a time, and sized with gelatine, and which is always rather uneven on account of the water-lines and there being no division of the pulp. For a long time M. Grimpé raised such formidable objections to this that our convictions on the subject might have been shaken if they had rested upon a less solid basis. The point has, however, been satisfactorily settled by experience, as M. Grimpé has found that he is able to print upon this paper as well as upon machine-made paper. Its uneven surface is not found to be any disadvantage; and, if placing the paper under the cylinder causes any expense which might be avoided by the use of continuous paper, the advantage of continuing the consumption of paper which has stood the test of four centuries, is worthy of some consideration.

Thus has the plan been carried out which we had unceasingly and perseveringly advocated. To state it simply, it consisted in covering the two surfaces of the paper (without changing its nature) with a device which could not be imitated by hand or transferred on to stone, and which might be printed with ordinary writing ink. It is the plan proposed by M. Grimpé, and improved upon, in some respects, by the suggestions of others, which has been alone found to possess all these advantages.

Lithography had, however, been proposed amongst other improvements, and has contributed very considerably to overcome the difficulties which presented themselves. Three very skilful artists, M.M. Knecht, Quinet, and Lemercier, have successively submitted to the government and the Commission some products both very curious and worthy of encouragement. If lithography be employed in the ordinary manner, lithographic ink must be used; but by printing from stones engraved in relief, ordinary ink may be employed, and by this means proofs of a very fine device may be produced upon any kind of paper. But lithography possesses this disadvantage, viz., that there is no mechanical process known by which a device may be reproduced upon any number of stones. This must be effected by engraving or tracing with a dry point upon the reserve with which the stone is covered; and the difficulty of reproducing identically the same design by this means will be apparent. Lithography may, however, be made available for covering at a very low price commercial documents, such as cheques, railway scrip, &c., with artistic devices of great beauty, and of so complicated a nature as to render their reproduction by hand extremely difficult. Merchants and companies who are in the habit of employing indelible devices, would find great advantage, both in a pecuniary point of view and as regards security, in the employment of lithographic devices printed in indelible ink.

The Academy will find no difficulty in appreciating the reserve which prevents our laying before them the numerous experiments by means of which our opinion has been formed. It was, no doubt, our duty to try all the known methods of forgery, and to improve upon them, if possible. This we have done, and have by that means obtained undeniable proof that any stamp or device hitherto known may be imitated. But it is also our duty to keep these dangerous experiments as secret as possible from the public, and make them known only to the government.

Such is the motive which prevents us from laying before the Academy the results of our experiments, and which obliges us to confine ourselves to a plain statement of facts, consisting merely of *ex parte* statements and opinions.

Scientific Adjudication.

Lincoln's Inn.—Vice-Chancellor of England's Court.

Thursday, 21st December, 1848.

WOODS *v* BOILLOT AND OTHERS.

THIS was a motion supported by Mr. Bethell, with whom was Mr. R. Pryor, for an injunction to restrain two of the defendants, named Harding and Northcote, from prosecuting a petition or application for letters patent for improvements in the bleaching of wax, which was a species of vegetable material from organic substances; and to restrain the defendant Boillot from presenting a like petition, or disclosing the secret of the invention. The circumstances of the case were as follows:—M. Louis Alexis

Boillot, a resident in Paris, was the inventor of the improvement in question, which was to be made applicable to the manufacture of candles, and being desirous of introducing his invention into this country, he agreed with M. Hyppolite Chauvier, that he should become a partner and proceed to London to sell the right of working the process, but not to conclude any arrangement, nor disclose the mode of working the invention, without Boillot's approbation. In pursuance of this agreement M. Chauvier came to London, and negotiated with Messrs. Woods (the plaintiffs), who were to obtain a patent at their own expense, and to take half the profits of the invention. A letter was then written by M. Chauvier to Boillot, acquainting him with the proposed agreement, to which Boillot agreed, but, in his written answer, continued in these words:—"On these conditions, and with other accessories which you may add thereto, in our common interest, I authorize you to enter into an engagement in my name with Messrs. Woods. I will ratify, as far as needful, all the stipulations which you will have subscribed to in my name." In consequence of this letter an instrument was prepared and an application for a patent made. In November last M. Boillot arrived in London, and having entered into another arrangement with the defendants, Harding and Northcote, refused to ratify the agreement which Chauvier had entered into with the plaintiffs, or execute the instrument which had been prepared. Under these circumstances the injunction was applied for, to restrain Harding, Northcote, and Boillot from applying for a patent, and Boillot from disclosing the secret of the invention.

Mr. Rolt and Mr. J. Bailly appeared for the defendants, and argued that the Court could not restrain a petition for a patent, which would be in fact curtailing the prerogative of the Crown to grant a patent, and that as the process did not appear on the bill or affidavits, an injunction could not be granted where, on a breach, it could not be discovered what had been done to constitute a ground for committal.

Mr. Bethell was heard in reply, and contended that there had been such a breach of a direct authority given by Boillot, as entitled the plaintiffs to the injunction, and, so far from keeping the invention a secret, they were proceeding to make it known, and now only sought to restrain others from preventing their doing so.

JUDGMENT.

The Vice-Chancellor.—Now, in the opinion I am going to express, I am much disposed to anticipate that neither side will be much disposed to agree, but I think that it will have the effect of doing that which the justice of the case requires.

Now, I have a very strong feeling upon my mind that the whole truth of this case is not yet before the Court, and circumstances of suspicion have been stated with respect to the conduct of Boillot; but I cannot quite acquiesce in the notion that, altogether, Chauvier has been acting fairly:—I will tell you what I have founded that upon;—I may be wrong, but I merely state it as being the impression produced on my mind by what has now been brought forward, and therefore I beg it to be understood that I press it no further and advance it no further than that.

Mr. Bethell.—Nothing has been said on that subject on the other side.

The Vice-Chancellor.—I know that.

Mr. Bethell.—And I should be glad to remove that impression from your Honor's mind.

The Vice-Chancellor.—I think I am bound to state the feeling that has been created in my mind by the bearing of the whole of the case. Now both Boillot and Chauvier concur in representing that the invention was the invention of Boillot only, and I was very much struck, when the instrument, which has actually been executed, was handed up to me, which, according to the affidavits, appears to have been prepared on behalf of the plaintiffs, the purchasers, by Messrs. Tatham and Co., and which was submitted to the revision, correction, and judgment, of Messrs. Vallance, on behalf of Messrs. Boillot and Chauvier; Chauvier being, as I understand, in London, and Boillot not. I was struck with the circumstance that the draft should have been allowed to assume this form, namely, that it should have recited that Chauvier and Boillot had invented the improvements in bleaching and preparing certain organic substances, and are desirous of securing letters patent for the same; that is the only recital, and it is a recital which does represent that the invention was a joint invention; and I particularly examined the affidavits of Chauvier and Boillot, in order to see if they both coincided in the representation that it was the invention of one. And then this instrument, being so prepared in the first instance, witnesseth that the said parties do appoint Woods, and so on, for the purpose of obtaining letters patent for the use of the said invention, and nothing else is mentioned, which goes to shew that it is an authority to procure letters patent for the invention by Boillot only. How that took place is not explained; it might have resulted from this, that that statement introduced into the draft was the consequence of some representation made by Chauvier.

Mr. Bethell.—No, no, sir, I can easily explain it.

The Vice-Chancellor.—That may be; but, as the case stands before me, I must regard the thing as it now appears; and taking for granted, at present, that the invention was the sole invention of Boillot, it appears to me, that this indenture, which has been executed, whatever authority Chauvier might have had to execute an indenture, has not had the effect of giving to the plaintiffs any right to procure letters patent for the invention of Boillot; and what appears therefore to me right to do in this case, at present, is not to make any order, but to reserve the costs of the motion, and leave the parties to proceed in whatever manner they please.

Mr. Bethell.—Would your Honor give me leave for a moment; this is a point that occurred to nobody, because all people have known the truth, and all people know how by mere *per incuriam* on the one side and on the other this thing has passed. Now I should desire very much that your Honor would permit this to stand over, and to let me have an opportunity of shewing how the draft came to be in this form, because I have myself enquired about it: I undertake to say your Honor will be satisfied.

The Vice-Chancellor.—Let me be understood distinctly: I am not imputing blame to anybody, but what I mean is this, it is the legitimate subject for further enquiry; but my opinion is, that the deed, standing as it does, and the claim being made under the deed, that I am not at liberty to grant an injunction, and therefore what I would do is this, I would make no further order on the present motion than this, that I would reserve the costs;—the parties of course may make any further application they please, at any time when they think they are in a proper situation to do so; and I make the order because, in my opinion, when an application is made to Her Majesty's Attorney-General for a patent, he will take care that no patent shall issue until the truth and the justice of the case, as between these contending parties, shall be made perfectly manifest; and it is therefore, in effect, though not in terms, granting the very injunction that you are asking for.

Mr. Bethell.—I am afraid your Honor will not find it so.

The Vice-Chancellor.—Well, it may not be, but I think that is the right order to make. You make any further application you like. I reserve the costs of the motion, that is the only order I make.

Mr. Bethell.—Only it has this effect, that this motion is now disposed of.

The Vice-Chancellor.—Yes, to a certain extent; but you may, at any time, if you please, renew the notice, and give notice to read all the affidavits.

Mr. Bethell.—It is a subject of regret to me. Your Honor will do as you think right; but it is always a subject of regret to me when the Court takes upon itself to decide upon a ground, being a ground of fact, which has never been brought into controversy, and on which it has no evidence.

The Vice-Chancellor.—I have not decided it on any grounds of fact.

Mr. Bethell.—Yes, upon a fact as to which there is no evidence.

The Vice-Chancellor.—I do not enter into that. I decide it upon the point before me.

Mr. Bethell.—Your Honor does decide it upon a ground of fact.

The Vice-Chancellor.—No.

Mr. Bethell.—Your Honor does—because you suppose it is the deliberate act of the party.

The Vice-Chancellor.—I do not suppose any such thing;—I expressly say, I do not suppose it, but it is a matter that ought to be cleared up.

Mr. Bethell.—The mode of clearing it up would be by allowing the thing to stand over.

The Vice-Chancellor.—I mentioned expressly the very objection that occurred to me upon the deed in the course of the argument.

Mr. Bethell.—I can explain it, but I never will, nor will I now undertake to state matters to the Court from the verbal intimation of the parties, until they are reduced into the form of an affidavit. I have examined the subject, and I can explain to your Honor, when you will allow a proper opportunity of doing so, but I shall never communicate at all things that are given to me here in Court, and which, of course, are not in a condition on which your Honor can judicially determine upon them.

The Vice-Chancellor.—Understand! what I decide upon is the particular form in which the deed is framed, which, as it is framed, has not, to my mind, given the plaintiffs any right to apply for a patent for the invention of Boillot.

Mr. Bethell.—I understand, no doubt it is not in conformity with the patent, as far as we have it here; the invention unquestionably was the invention of Boillot, and not the joint invention of Boillot and Chanvier.—But your Honor should also bear in mind, that this language was approved of and confirmed by Mr. Vallance, the solicitor, that it has not been complained of in any affidavit.

The Vice-Chancellor.—I understand that.

Mr. Bethell.—If it had been, it would have been such.

ON THE INFLUENCE OF ELECTRICITY UPON VEGETATION.

BY JOHN NOTT, ESQ.*

THE potato blight in Ireland has called forth a great deal of speculation, but the reasonings on this subject being, generally speaking, limited to mere secondary causes, have afforded no clue to the establishment of any general principle—and hence, after all the discussion that has taken place, we find Ireland again involved by a repetition of this sad calamity.

In May, 1847, I published an essay on this subject,† in which, as a consequence deduced from certain views which I propounded, I ventured to suggest the adoption of lightning-conductors as a remedy, or rather preventative, particularly where the land was denuded of trees. I am not aware that any notice had been taken in Ireland of this publication, until some abstracts from it found a place in the *Land Agents' Gazette*. I have no doubt that a perusal of the following facts will render this a matter of regret; for, otherwise, some of the agriculturists of Ireland might have been induced to adopt, even experimentally, a suggestion at once so simple and so easy of application.

I now deem it a duty to state that the essay, above mentioned, fell into the hands of Mr. Watkins, a gentleman having property in South Wales, and he, coinciding with the views therein set forth, determined, at once, to put them to the test of experiment. For this purpose, he erected, in a potato-field, six lightning or, more properly speaking, electricity conductors, made of pointed iron rods. Three of these conductors were planted in the earth in the usual manner, and the three others were insulated from the earth, by means of frames of wood, which latter were fastened upon flag-stones, about eighteen inches square.

I must here observe, that Mr. Watkins, wishing the experiment to be as generally decisive as possible, had also some carrots, parsnips, and turnips, planted in the same field.

On the 27th of October, 1847, he invited a friend of mine, whom he knew was then in Wales, to witness the result of his experiment, when, on examination, the following facts were observed:—The potatoes and other vegetables in the field were found be perfectly sound and good, with the remarkable exception of those in the immediate neighbourhood of the three insulated conductors above described. All round these three latter conductors, within a circular area of about three feet six inches radius, the potato-leaves and stalks presented the usual appearances of the blight, and the tubers were so bad as to be unfit for the food of pigs; the carrots were also greatly affected; but, what is not a little remarkable, the few parsnips and turnips which were found within the above-mentioned areas were apparently uninjured.

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* This paper, which originally appeared in the *Land Agents' Gazette* (an Irish periodical), has, in a revised state, been communicated to us by the author; and we the more readily avail ourselves of the further publication of the facts it demonstrates, as it is a pendant to a paper previously communicated to us by the same author, and entitled "*The Probable Causes of the Irish Famine*," wherein his theory of electrical influence upon vegetation (the truth of which he now considers proved) is explained.

† See Vol. XXXI., p. 39, Conjoined Series.

Mr. Watkins then said that he conceived there could not be two opinions on the subject, that these results completely established the truth of the theory, and the appropriateness of the remedy which had been suggested, and requested my friend to inform me that he would send me a detailed report of the experiment, a copy of which he intended to lay before the Agricultural Society, of which, I believe, he was a member;—but I very much regret to add, before the report was finished, that he was attacked with influenza, and died at Cheltenham.

It must be admitted that this experiment was judiciously carried out; nevertheless it would have been much more satisfactory if a register of the electrical state of the atmosphere had been kept, and particularly of that of the three insulated conductors, for then the nature of the electricity which, no doubt, effected the destruction of the plants in the neighbourhood of these conductors, would be known, and also the general direction of its motion,—whether from the earth to the atmosphere, or from the atmosphere to the earth. Thus, questions of the highest importance, in a chemical point of view, would have been ascertained, and the nature of the interference with the excrementitious fluids of the injured plants pointed out,—whether, in short, as a consequence of the electrical circumstances in which they had been placed, their destruction was effected by too great an exudation or absorption of oxygen.

The inferences that may be drawn from the results of this experiment are of extreme complexity; nevertheless I will endeavour to elucidate them, and examine how far the facts detailed justified the opinion expressed by the late Mr. Watkins, which amounted to this:—that an undue interchange of electrical action between the earth and the atmosphere was apparently the cause of the potato-blight.

That electricity plays a primary part in all the natural phenomena which take place on the surface of the earth, admits, at the present day, of no dispute; for it has been demonstrated that no body enters into decay or decomposition, without electricity, in some form, being produced. Therefore, no matter how obvious any secondary or proximate cause may appear, we can never have an accurate or philosophic conception of any given natural effect, until we are able to trace the part that electricity has taken in its production.

With respect to the potato-blight found in three different spots only of the field of the late Mr. Watkins, as no other sufficient cause can be assigned, I am therefore entitled to refer it to electricity. The only difficulty in this case is to prove that electricity, in a free state, must have been present in these three different places, and then to point out, by analogical reasoning, its *modus operandi* in producing the effects witnessed. If every one of the phenomena generally observed in the potato-blight cannot thus be satisfactorily accounted for, I admit the reasoning falls to the ground.

Let me here recapitulate the facts. Within the same field, one portion of the crop, which was protected by lightning conductors, was found in excellent condition; and, in three different places, the other, which was exposed to the action of what I will call electricity accumulators, was found in a state of decay—the leaves, stalks, and tubers, of this latter portion, presenting all the diagnostic appearances of the blight. It will now be necessary to appeal to certain electrical principles to ascertain the nature of the influence which must have been exerted, first, by the conductors, and, secondly, by what I have denominated the accumulators. Assuming the existence of two electricities—which appears to be the only rational theory of electricity, because it is impossible to conceive the existence of a composing or decomposing power, without a duality of principle—when these electricities are united they form a neutral fluid, which exists in a latent state in all bodies; when they are separated, by any means, they are then said to be free; and if accumulated, so as by their mutual attraction to force their passage through non-conducting bodies, lightning or electrical light is perceptible, and a deflagrating or destroying power is exerted. But when, by any electro-motive power, whether existing in nature or formed artificially, these electricities are continuously separated, at the same time that, through conducting bodies, a channel of communication is formed between them, then, and then only, what is called an electric current is established, which exerts not only a composing but a decomposing power—one body being generally forming while another is being destroyed.

Before applying these principles to the elucidation of the effects witnessed in the experiment of the late Mr. Watkins, I must observe, that electricity is generally found to exist in a free state in the atmosphere, and the earth is, and must therefore always be, in an opposite electrical state. These electrical states mutually act and re-act upon each other, and are generally maintained in equilibrium by a neutral stratum of atmosphere, which is found to exist immediately over the surface of the earth. This neutral stratum must be of the highest importance to vegetation, as it protects the latter from any undue action of electricity; nevertheless its existence is, in a great measure, dependant upon the hygrometrical state of the atmosphere in different localities.

The utility of the three non-insulated conductors will now be easily comprehended; for, by their incessant action, they must have prevented, up to the limits of their altitude, any dangerous accumulation of electricity in the atmosphere, and, consequently, performed one of the functions of its neutral stratum, by protecting the plants, within the sphere of their influence, from any effects which we may suppose atmospheric electricity capable of producing.

It is by no means so easy to estimate the series of electrical actions and re-actions that must have been produced by the three insulated conductors or accumulators. These conductors being constantly under the inductive influence of the earth, must have also abstracted electricity from the atmosphere; the free electricity they therefore contained, re-acted upon that of the earth, immediately beneath them, and increased its intensity;—the altitude of the neutral stratum of atmosphere was, therefore, reduced to the distance between the lower ends of these conductors and the surface of the earth. All the plants within the sphere of their influence must also have been electric by induction; consequently, from the non-existence immediately over the plants of any protecting or neutral stratum of atmosphere, an interchange of electrical action between the earth and the atmosphere must have continuously taken place through these plants. In such a case, it is indubitable that electric currents would be established in the stalks of the plants; and the earth being negative, and the atmosphere positive, the direction of motion of these currents would be downwards, or from the atmosphere to the earth. Therefore the leaves of the plants would form the positive pole, and the stalks, at the point of contact with the earth, and the tubers, would form the negative pole of this rheo-electric arrangement.

It has been proved, that an electric current, formed in a similar manner to that which I have now described, possesses a decomposing power, identical with that of an ordinary Voltaic pile. Then, if it be admitted that the destroyed plants had been placed in these electrical conditions—and, in my humble opinion, it scarcely admits of a doubt—it follows that the blight observed upon them was produced by their vital functions having been interfered with by the decomposing power of electric currents.

If the premises warrant this conclusion, every one of the phenomena of the potato blight will be easily and satisfactorily accounted for. Because, the plants forming a portion of the rheo-electric arrangement, their vital fluids would, of necessity, undergo decomposition,—alkalis would be repelled to the negative pole, and oxygen to the positive. A series of polar arrangements would also exist in the different parts of which the plant is composed,—first, between the upper and the under surface of the leaves; next, between the lower end of the stalk and the fibres; and, lastly, as it has been experimentally proved with respect to various kinds of fruit, between the stem and the principal eye of the tuber.

Now, to limit consideration to the decomposition of the carbonic acid which is elaborated during vegetation, the oxygen of this acid, instead of being expelled by the leaves, would be retained at their positive or upper surface, and this effect would necessitate an alkaline deposit at their negative or under surface;

therefore, by the retention of this excrementitious oxygen, some other acid would unquestionably be formed; but the nature of this latter acid would depend upon the organic substances either naturally existing in the plant, or abstracted from the earth by capillary action. For instance, if sulphur were present, sulphuric acid may be formed; or from the constant presence of carbon, hydrogen, and oxygen, acetic acid may be formed; or again, the retained oxygen being electric, may attract azote even from the atmosphere. In this latter case, nitric or rather nitrous acid may be found, and thus may not only the brown blotches on the upper surface of the leaves, but the greyish ones on their under surface, be satisfactorily accounted for. The same reasoning will account for the upper surfaces of the tubers, near the stem, being effected at the commencement of the disease, and not the under, and also for the great effect generally observed in that part of the stalk in contact with the electric surface of the earth.

In the preceding view of the cause of the potato blight, I have assumed the electricity of the earth to be, as it generally is, negative, and that of the atmosphere positive; but it is well known that the atmosphere, on the contrary, is sometimes negative. Now, if this negative state of the atmosphere were general in any locality, there can be no doubt that the earth in that locality would be positive. Various experiments are on record which clearly prove that these latter electrical conditions of the earth and the atmosphere, even supposing the non-existence of any superinduced electric currents in the plants growing in the locality, are incompatible with a healthy state of vegetation. The reason must now be obvious; for, in this case, the leaves of the plants, instead of giving out oxygen, as in a healthy state, they always do, when the sun is above the horizon, must have a tendency to take it from the atmosphere. The oxygen abstracted from the moisture of the earth would then be retained by the tubers, and would there go to the formation of a noxious acid. The under surface or the eye of the tubers would therefore be affected, and not the stems; and the leaves, for some time at least, would afford no other indication of the decay going on, than a generally increasing paleness of appearance. Of course if, in such circumstances, electric currents were established in the plants, the decay would be much more rapid and decisive.

It would be quite unnecessary, on the present occasion, to pursue these deductions any furthur; but if there be truth in the principles to which I have appealed, then I submit that I have inductively proved that the blight which partially effected the crop of the late Mr. Watkins was produced by electricity, and, consequently, as like effects may safely be attributed to like causes, the potato blight in general must be of electric origin.

Though every mind may not be prepared to ratify these conclusions, let me at least hope that I have now placed this vitally important subject in such a light as to preclude the probability of its remaining without further investigation.

LIST OF REGISTRATIONS EFFECTED UNDER THE ACT FOR PROTECTING NEW AND ORIGINAL DESIGNS FOR ARTICLES OF UTILITY.

1848.

Nov. 30. *Clarke & Timmins*, of Birmingham, for a music-stool, screw, tube, and box.

Dec. 1. *Ephraim Slynn & William Green*, of Wolverhampton, for a cabin-door lock.

4. *Captain H. Mangles Denham, R. N.*, of the Senior United Service Club, Pall Mall, for a tiller.

5. *Joseph Faulding*, of 40, Robert-street, Hampstead-road, for apparatus for applying steam and vapour heat to parts of the human body.

5. *James Hayes*, of Elton, Huntingdonshire, for the "pedo-manu-motive."

6. *Thomas Barr*, of 10, Park-lane, Glasgow, for a duplex block for printing yarn in the hank.

7. *John Gedge*, of 4, Wellington-street, Strand, London, for a safety hammer for the locks of percussion firearms.

7. *Henry Smith & Thomas Woodhouse Ashby*, of Stamford, for an agricultural cart.

12. *James Tod & Son*, of Edinburgh, engineers, for a railway carriage cork buffer.

12. *John Rogers*, of 4, Doris-street, Princes-road, Kennington, for an improved draft accelerator.

13. *T. H. Thompson, C. E.*, of the Strand, for a blind-roller.

13. *James Wallis Dann*, of 46, Cromer-street, Gray's-inn-road, London, for an improved ball-valve.

15. *Mac Lardy & Lewis*, of Salford, for an improved flyer-top for preparing and spinning cotton and other fibrous substances.

15. *Robert Sargison*, of New Walsoken, Wisbeach, millwright, for an improved straw-shaking machine, for separating the corn from the pulse.

16. *Timothy Adams Jordan*, of 20, Pump-row, Old-street-road, London, for a tyre for a wheel.

16. *Stephen Barton*, of Nelson-street, Bristol, for an open or close carriage, with a round-cornered glass front.

16. *Myer Myers*, of Birmingham, for a pen-holder.

18. *A. Grant Brothers*, of 2, Clement's-court, Wood-street, Cheapside, London, for the "Beaufort collar."

18. *Joseph Fenn*, of Newgate-street, London, tool maker, for a double-headed cylinder wrench.

19. *William Henry Neuber*, of 76, Long Acre, London, for a placard-holder.

Dec. 19. *Thomas Davey Durrant*, of Lindfield, Sussex, for an improved sound-board receiver for pianofortes.

20. *Joseph Samuel Hodge*, of 462, New Oxford-street, Middlesex, for a safety pocket or receptacle.

20. *John Hitchen*, of Priestland Cottage, Tarporley, in the county of Chester, for a vent-peg.

23. *Thomas Davis*, of Warwick, for a thrashing-machine.

26. *Thewlis & Griffith*, of Phœnix Iron and Tool Works, Warrington, for a churn.

List of Patents

That have passed the Great Seal of IRELAND, from the 17*th November to the* 17*th December*, 1848, *inclusive.*

To Joseph Eugene Asaert, of Lille, in the Republic of France, machinist, for improved means of obtaining motive power.—Sealed 22nd November.

Pierre Frederick Gougy, of Leicester-square, in the county of Middlesex, Gent., for improvements in apparatus and machinery for raising, lifting, and otherwise moving heavy bodies.—Sealed 30th November.

Alfred Vincent Newton, of the Office for Patents, 66, Chancery-lane, in the county of Middlesex, mechanical draughtsman, for certain improvements in the manufacture of steel,—being a communication to him from a foreigner residing abroad.—Sealed 2nd December.

Joseph Lillie, of Manchester, in the county of Lancaster, engineer, for certain machinery or apparatus applicable for purifying and cooling liquids, and for purifying, condensing, and cooling gases.—Sealed 5th December.

Hugh Bell, of London, Esq., for certain improvements in aerial machines, and machinery in connection with the buoyant power produced by gaseous matter.—Sealed 9th December.

List of Patents

Granted for SCOTLAND, subsequent to November 22nd, 1848.

To John Armstrong, of Edinburgh, for improvements in constructing water-closets.—Sealed 23rd November.

Edward Duncombe Lines, of Chelsea, soda-water manufacturer, and Samuel Luz Freemont, of Love Lane, London, for improvements in the manufacture of colors, oils, and varnishes, acids, and spirits, and in the manufacture of charcoal, and also in treating vegetable substances for and in obtaining and treating extractive matters therefrom.—Sealed 24th November.

Joseph Lewis, of Salford, machine-maker, and William Mac Lardy, of the same place, manager, for certain improvements in machinery or apparatus applicable to the preparation and spinning of cotton, wool, silk, flax, and other fibrous substances.—Sealed 27th November.

John Harris, of No. 4, Richard's-terrace, Albion-street, Rotherhithe, engineer, for a mode or modes of founding type, and of casting in metal, plaster, and certain other materials.—Sealed 28th November.

Alexander Parkes, of Birmingham, chemist, for improvements in the manufacture of metal and in coating metals.—Sealed 30th November.

Alexander Balfour, of Dundee, leather merchant and manufacturer, for improvements in apparatus for cutting metal washers and other articles, and in the construction of buffers.—Sealed 4th December.

Christian Schiele, of Manchester, mechanician, for certain improvements in the construction of cocks or valves, which improvements are also applicable for reducing the friction of axles, journals, bearings, or other rubbing surfaces of machinery in general.—Sealed 4th December.

William Young, of the firm of Henry Bannerman and Sons, of Manchester, merchant, for certain improvements in machinery or apparatus for winding, balling, or spooling thread, yarn, or other fibrous materials.—Sealed 8th December.

Alfred Vincent Newton, of the Office for Patents, 66, Chancery-lane, for improvements in casting printing types and other similar raised surfaces, and also in casting quadrats and spaces, —being a foreign communication.—Sealed 11th December.

James Henry Staple Wildsmith, City-road, London, chemist, for improvements in the purification of naphtha (likewise called wood spirit and hydrated oxide of methyle) pyroligneous acid, and cupion, and certain other products of the destructive distillation of wood, peat, and certain other vegetable matters, and of acetate of lime and shale, and in the purification of coal-tar and mineral naphtha, likewise spirit, being the products of fermentation.—Sealed 12th December.

Henry Newson, of Smethwick, near Birmingham, for an improvement or improvement in trusses.—Sealed 13th December.

Duncan Mackenzie, of Goodman's Fields, London, manufacturer, for certain improvements in Jacquard machinery for figuring fabrics and tissues generally, and apparatus for transmission of designs to the said Jacquard machinery, parts of which are applicable to playing musical instruments, composing printing-types, and other like purposes.—Sealed 22nd December.

New Patents
SEALED IN ENGLAND.
1848.

To John Lane, of Liverpool, and John Taylor, of the same place, engineers, for improvements in engines, boilers, and pumps, in rotary carriages, in propelling vessels, in the construction of boats, in extinguishing fire, and in brewing. Sealed 29th November—6 months for inrolment.

Edward Schunck, of Rochdale, in the county of Lancaster, chemist, for improvements in the manufacture of malleable iron, and in treating other products obtained in the process. Sealed 29th November—6 months for inrolment.

William Rothwell Lomax, of Banbury, in the county of Oxford, engineer, for improvements in machines for cutting hay and straw into chaff, and for cutting other vegetable substances.—Sealed 29th November—6 months for inrolment.

Jonah Davies and George Davies, of the Albion Iron Foundry, Staffordshire, iron-founders, for improvements in steam-engines. Sealed 2nd December—6 months for inrolment.

Robert Burn, of Edinburgh, for an improved roller-gin, used in separating the seed from cotton. Sealed 2nd December—6 months for inrolment.

Francis Hastings Greenstreet, of Liverpool, engineer, for certain improvements in hydraulic engines. Sealed 2nd December—6 months for inrolment.

John Armstrong, of Edinburgh, Mid Lothian, brass founder, for improvements in constructing water-closets. Sealed 2nd December—6 months for inrolment.

George Armstrong, of Newcastle-upon-Tyne, Esq., for certain improvements in steam-engines. Sealed 2nd December—6 months for inrolment.

Frederick Collier Bakewell, of Hampstead, Gent., for improvements in making communications from one place to another by electricity. Sealed 2nd December—6 months for inrolment.

William Young, of the Firm of Henry Bannerman and Sons, of Manchester, merchant, for certain improvements in machinery or apparatus for winding, balling, or spooling thread, yarn, or other fibrous materials. Sealed 2nd December—6 month for inrolment.

Robert Nelson Collins, of Oxford-court, Cannon-street, in the city of London, wholesale druggist, for certain improved compounds to be used for the prevention of injury to health under certain circumstances. Sealed 2nd December—6 months for inrolment.

James Taylor, of 15, Furnivals Inn, in the county of Middlesex, Gent., for improvements in propelling ships and other vessels; being a communication. Sealed 2nd December—2 months for inrolment.

John Henderson Porter, of 2, Adelaide-place, London-bridge, engineer, for an improved mode of applying corrugated iron in the formation of fire-proof floors, roofs, and other like structures. Sealed 2nd December—6 months for inrolment.

John Duley, of Northampton, iron founder, for certain improvements in the construction and arrangement of stoves for cooking, and other purposes. Sealed 2nd December—6 months for inrolment.

Thomas Drayton, of Regent-street, in the county of Middlesex, practical chemist, for improvements in silvering glass and other surfaces. Sealed 4th December—6 months for inrolment.

James Young, of Manchester, manufacturing chemist, for improvements in the preparation of certain materials used in dyeing and printing. Sealed 9th December—6 months for inrolment.

John Gardner, of Wakingham, in the county of Berks, engineer, for improvements in girders for bridges and other structures. Sealed 9th December—6 months for inrolment.

William Ironside Taite, of Rugby, in the county of Warwick, printer and bookseller, for an improved method or methods of producing outlines on paper, pasteboard, parchment, papier-mâché and other like fabrics. Sealed 9th December—6 months for inrolment.

Andrew Lamb, of Southampton, engineer, and William Alltoft

Summers, of Millbrook, Southampton, engineer, for certain improvements in steam-engines and steam-boilers, and in certain apparatus connected therewith. Sealed 9th December—6 months for inrolment.

John Tutton, of South Audley-street, in the county of Middlesex, mechanist, for certain improvements in the construction and arrangement of certain parts of buildings. Sealed 9th December—6 months for inrolment.

Christopher Nickels, of the Albany-road, Camberwell, Gent., for improvements in the manufacture of gloves and articles of dress and furniture. Sealed 9th December—6 months for inrolment.

William Palmer, of Sutton-street, Clerkenwell, manufacturer, for improvements in the manufacture of candles. Sealed 9th December—6 months for inrolment.

George Lawrence Lee, of Holborn, lithographer, for improvements in producing ornamental designs. Sealed 11th December—6 months for inrolment.

Edmund Hartley, of Oldham, in the county of Lancaster, mechanic, for certain improvements in machinery or apparatus to be employed in the preparation and spinning of cotton and other fibrous substances. Sealed 11th December—6 months for inrolment.

Joseph Eccles, of Moorgate Fold Mill, near Blackburn, Lancashire, cotton spinner, and James Bradshaw and William Bradshaw, of the same place, watchmakers, for certain improvements in and applicable to looms for weaving various descriptions of plain and ornamental textile fabrics. Sealed 15th December—6 months for inrolment.

William Wharton, superintendent of the carriage department at the London and North-Western Station, Euston-square, for certain improvements in the construction of vehicles used on railways or on other roads and ways. Sealed 16th December—6 months for inrolment.

Henry Walker, of Gresham-street, in the city of London, needle manufacturer, for certain improvements in the process or processes of manufacturing needles. Sealed 16th December—6 months for inrolment.

William Wild, of Salford, Lancashire, moulder, for certain improvements in rotary steam-engines. Sealed 16th December—6 months for inrolment.

Alfred Vincent Newton, of the Office for Patents, 66, Chancery-lane, Middlesex, mechanical draughtsman, for improvements in casting printing types and other similar raised surfaces; and also in casting quadrats and spaces,—being a communication. Sealed 16th December—6 months for inrolment.

William Clay, of Clifton Lodge, in the county of Cumberland, engineer, for certain improvements in machinery for rolling iron or other metals,—parts of which improvements are applicable to other machinery in which cylinders or rollers are used. Sealed 16th December—6 months for inrolment.

Joseph Deeley, of Newport, in the county of Monmouth, engineer, for improvements in ovens and furnaces. Sealed 16th December—6 months for inrolment.

William Major, of Culchett, near Leigh, Lancashire, manufacturer, for improvements in looms for weaving certain descriptions of cloths. Sealed 16th December—6 months for inrolment.

Edward Smith, of Kentish-town, window-blind manufacturer, for improvements in window-blinds, and in springs applicable to window-blinds, doors, and other like purposes. Sealed 16th December—6 months for inrolment.

John Cartwright, of Sheffield, joiners' tool manufacturer, for an improved brace for the use of carpenters and others. Sealed 16th December—6 months for inrolment.

John Clinton, of Greek-street, Soho, professor of music, for improvements in flutes. Sealed 16th December—6 months for inrolment.

Thomas Dickins, of Middleton, Lancashire, silk manufacturer and printer, for certain improvements in machinery or apparatus for warping and beaming yarns or threads composed of silk or other fibrous materials. Sealed 21st December—6 months for inrolment.

James Henry Staple Wildsmith, of the City-road, experimental chemist, for improvements in the purification of naphtha (likewise called wood-spirit and hydrated oxide of methyle), pyroligneous acid, and eupion, and certain other products, of the destructive distillation of wood, peat, and certain other vegetable matters, and of acetate of lime and shale; and in the purification of coal-tar and mineral naphtha, likewise spirit, being the products of fermentation. Sealed 21st December—6 months for inrolment.

John Travis and John Mc Innes, of Liverpool, lard refiners, for improvements in packing lard. Sealed 21st December—6 months for inrolment.

Charles Augustus Holm, of King William-street, in the county of Middlesex, civil engineer, for improvements in printing. Sealed 21st December—6 months for inrolment.

William Riddell, of White Friar-street, Gent., for improvements in the construction of ever-pointed pencils, writing and drawing instruments, and in inkstands or inkholders. Sealed 21st December—6 months for inrolment.

William Baker, of Edgbaston, near Birmingham, civil engineer, and John Ramsbottom, of Longsight, near Manchester, engineer, for improvements in the construction of railway wheels, and in railway turn-tables,—which latter improvements are applicable to certain shafts or axles driven by steam or other motive power. Sealed 21st December—6 months for inrolment.

Pierre Armand Le Comte de Fontainemoreau, of South-street, Finsbury-square, London, for certain hygienic apparatus and processes for preventing and curing chronical and other affections, and to prevent or stop certain epidemic diseases,—being a communication. Sealed 21st December—6 months for inrolment.

John Penn, of Greenwich, engineer and manufacturer of steam-engines, for certain improvements in steam-engines, of the kind or class commonly called marine steam-engines. Sealed 21st December—6 months for inrolment.

William Wilkinson, of Dudley, in the county of Worcester, manufacturer, for a certain improvement or certain improvements in the construction and manufacture of vices. Sealed 21st December—6 months for inrolment.

William Curtain, of 11, Retreat-place, Homerton, Gent., for certain improvements in the method of manufacturing Brussels, tapestry, Turkey, and velvet or cut pile carpets and velvets, silk, linen, mixed cloths, and rugs of all descriptions; by which method less warp is required, and perfect and regular figures or patterns are produced. Sealed 21st December—6 months for inrolment.

Charles Low, of Roseberry-place, Dalston, in the county of Middlesex, Gent., for improvements in smelting copper ore.—Sealed 28th December—6 months for inrolment.

George Fergusson Wilson, of Belmont, Vauxhall, Gent., and Charles Humfrey, of Manor-street, Old Kent-road, merchant, for improvements in the production of light by burning oleic acid in lamps, and in the construction of lamps and manufacture or preparation of oleic acid for that purpose. Sealed 28th December—6 months for inrolment.

William Dingle Chowne, of Connaught-place West, in the county of Middlesex, M.D., for improvements in ventilating rooms and apartments. Sealed 28th December—6 months for inrolment.

Moses Poole, of the Bill Office, London, Gent., for improvements in the manufacture of heels for boots and shoes, of swivels, of bag fastenings, of revolving furniture, and of the connection of pipes for gas and other fluids,—being a communication. Sealed 28th December—6 months for inrolment.

John Mitchell, chemist, Henry Alderson, civil engineer, and Thomas Warriner, farmer, of Lyon's wharf, Upper Fore-street, Lambeth, for improvements in smelting copper. Sealed 28th December—6 months for inrolment.

Robert Jobson, of Holly Hall Works, near Dudley, Staffordshire, engineer, for improvements in the manufacture of stoves.—Sealed 28th December—6 months for inrolment.

Israel Kinsman, late of New York, but now of Ludgate-hill, merchant, for improvements in the construction of rotary engines, to be worked by steam, air, or other elastic fluid. Sealed 28th December—6 months for inrolment.

William Edward Newton, of the Office for Patents, 66, Chancery-lane, civil engineer, for certain improvements in steam-engines,—being a communication. Sealed 28th December—6 months for inrolment.

Disclaimer and Amendment

OF PART OF AN INVENTION

MADE UNDER LORD BROUGHAM'S ACT.

Disclaimer filed with the Clerk of the Patents for England, on the 23rd December, 1848, to the specification of a patent granted to Deane Samuel Walker, of London Bridge, merchant, for improvements in the manufacture of bands or straps for hats, caps, shoes, and stocks,—dated the 24th June, 1848,—whereby he disclaims in the title of the said patent the words "*or straps,*" and the words "*caps, shoes, and stocks.*"

CELESTIAL PHENOMENA FOR JANUARY, 1849.

D.	H.	M.	
1			Clock before the ☉ 3m. 58s.
	—		☽ rises 11h. 28m. M.
	—		☽ passes mer. 5h. 32m. A.
	—		☽ sets 11h. 47m. A.
	8	56	♃'s second sat. will. im.
	11	5	♃'s first sat. will im.
	14	6	☉ in Perigee
2	5	51	♅ in conj. with the ☽ diff. of dec. 2. 21. N.
	7	38	☽ in □ or first quarter
3			Occul. ϵ^1 Ceti, im. 5h. 46m. em. 6h. 38m.
5			Clock before the ☉ 5m. 48s.
	—		☽ rises 1h. 32m. A.
	—		☽ passes mer. 9h. 6m. A.
	—		☽ sets 3h. 34m. M.
	—		Occul. 48 Tauri, im. 8h. 35m. em. 9h. 11m.
	—		Occul γ Tauri im. 10h. 39m. em. 11h. 27m.
	—		Occul. θ^1 Tauri, im. 14h. 39m. em. 15h. 31m.
	—		Occul. θ^2 Tauri, im. 14h. 14m. em. 15h. 26m.
	—		Occul. B.A.C. 1391, im. 15h. 29m. em. 16h. 16m.
	—		Occul. 85 Tauri, im. 16h. 21m. em. 16h. 27m.
6			Occul. 111 Tauri, im. 11h. 48m. em. 12h. 37m.
	15		☽ in Perigee
	18	30	♃'s first sat. will im.
7			Occul. 26 Geminorum, im. 18h. 8m. em. 18h. 57m.
8	5	59	♅ in □ with the ☉
	11	33	♃'s second sat. will im.
	12	58	♃'s first sat. will im.
8	8	13	☿ in sup. conj. with the ☉
	10	50	Ecliptic oppo. or ○ full moon
10			Clock before the ☉ 7m. 55s.
	—		☽ rises 6h. 36m. A.
	—		☽ passes mer. 1h. 7m M.
	—		☽ sets 1h. 41m. M.
	18	15	♃ in conj. with the ☽ diff. of dec. 2. 59. N.
12			Occul. r Leonis, im. 20h. 12m. em. 20h. 33m.
14			Occul. 38 Virginis, im. 12h. 5m. em. 13h. 7m.
	8	49	♃'s fourth sat. will em.
15			Clock before the ☉ 9h. 48m.
	—		☽ rises Morn.
	—		☽ passes mer. 5h. 14m. M.
	—		☽ sets 11h. 3m. M.
	14	9	♃'s second sat. will im.
	14	52	♃'s first sat. will im.
	6	54	☽ in □ or last quarter
	22	13	☿ greatest hel. lat. S.
			Mercury R.A. 20h. 23m. dec. 21. 31. S.
17			Venus R.A. 22h. 46m. dec. 9. 6. S.
	—		Mars R. A. 17h. 54m. dec. 23. 54. S.
	—		Vesta R. A. 0h. 30m. dec. 3. 43. S.
	—		Juno R. A. 5h. 10m. dec. 1. 50 N.
	—		Pallas R.A. 16h. 57m. dec. 4. 4. N.
	—		Ceres R. A. 17h. 5m. dec. 20. 23. S.
	—		Jupiter R. A. 9h. 31m. dec. 15. 42. N.
	—		Saturn R. A. 23h. 31m. dec. 5. 24. S.
	—		Georg. R. A. 1h. 9m. dec. 6. 42. N.
	—		Mercury passes mer. 0h. 36m.
	—		Venus passes mer. 2h. 59m.
	—		Mars passes mer. 22h. 6m.
	—		Jupiter passes mer. 13h. 41m.
	—		Saturn passes mer. 5h. 24m.
	—		Georg. passes mer. 5h. 21m.
17	8	10	♃'s third sat. will im.
	9	20	♃'s first sat. will im.
18	12		☽ in Apogee
19			Reappearance of ♄'s ring
20			Clock before the ☉ 11m. 24s.
	—		☽ rises 4h. 23m. M.
	—		☽ passes mer. 5h. 58m. M.
	—		☽ sets 1h. 29m. A.
21			Juno stationary
	7	14	♂ in conj. with the ☽ diff. of dec. 5. 22. S.
22	16	45	♃'s first sat. will im.
	16	46	♃'s second sat. will im.
24	10	3	Ecliptic conj. or ● new moon
	12	9	♃'s third sat. will im.
	23	37	♀ in conj. with the ☽ diff. of dec. 4. 3. S.
25			Clock before the ☉ 12m. 42s.
	—		☽ rises 8h. 8m. M.
	—		☽ passes mer. 1h. 8m. A.
	—		☽ sets 6h. 5m. A.
27			Occul. 96, Aquarii, im. 16h. 7m.
	13	14	☿ in conj. with the ☽ diff. of dec. 0. 17. N.
	15	7	♄ in conj. with the ☽ diff. of dec. 1. 16. S.
28	12	55	Vesta in conj. with 20 Ceti, diff. of dec. 0. 15. S.
	14	39	♀ in conj. with ♄ diff. of dec. 1. 44. N.
29	11	28	♅ in conj. with the ☽ diff. of dec. 2. 37. N.
30			Clock before the ☉ 13m. 39s.
	—		☽ rises 10h. 28m. M.
	—		☽ passes mer. 5h. 10m. A.
	—		☽ sets Morn.
31	4	43	☽ in □ or first quarter
	16	7	♃'s third sat. will im.

J. LEWTHWAITE, Rotherhithe.

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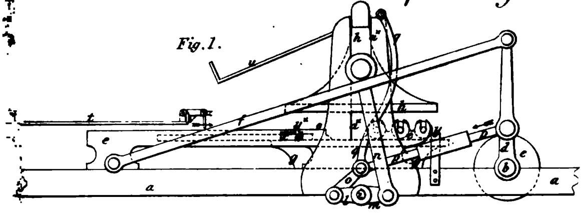

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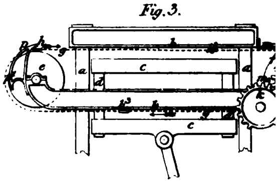

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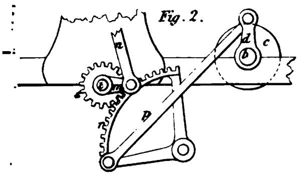

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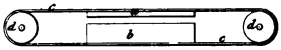

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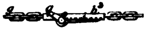

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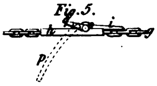

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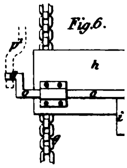

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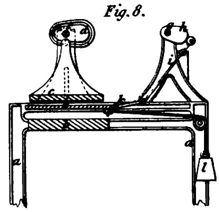

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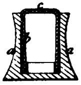

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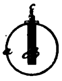

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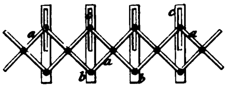

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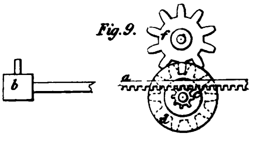

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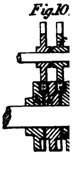

Anderson's imp^{ts} in spinning.

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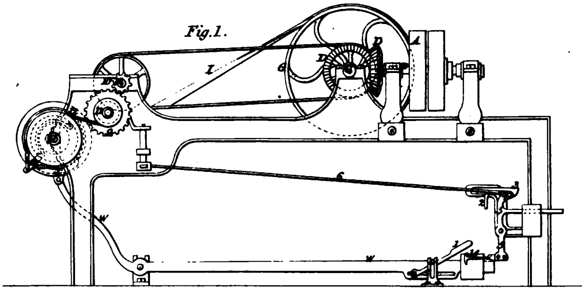

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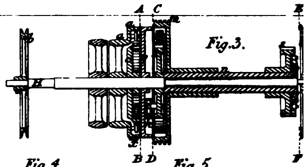

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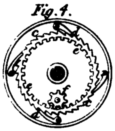

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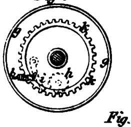

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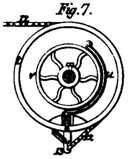

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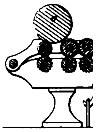

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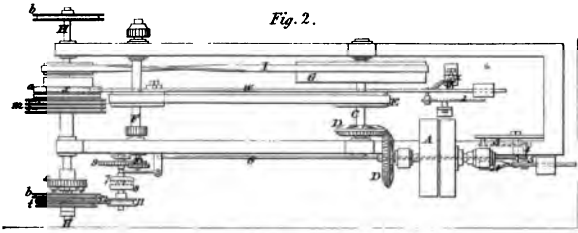

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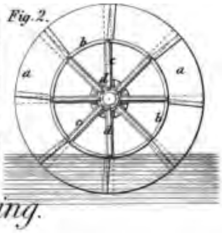
Fig. 2.



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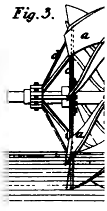

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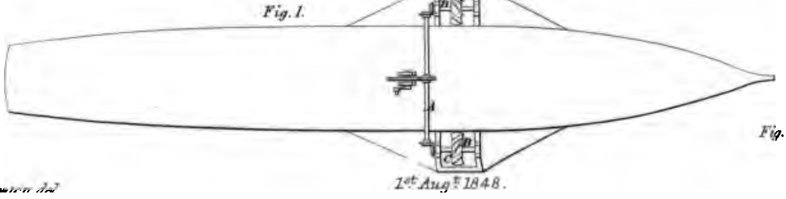

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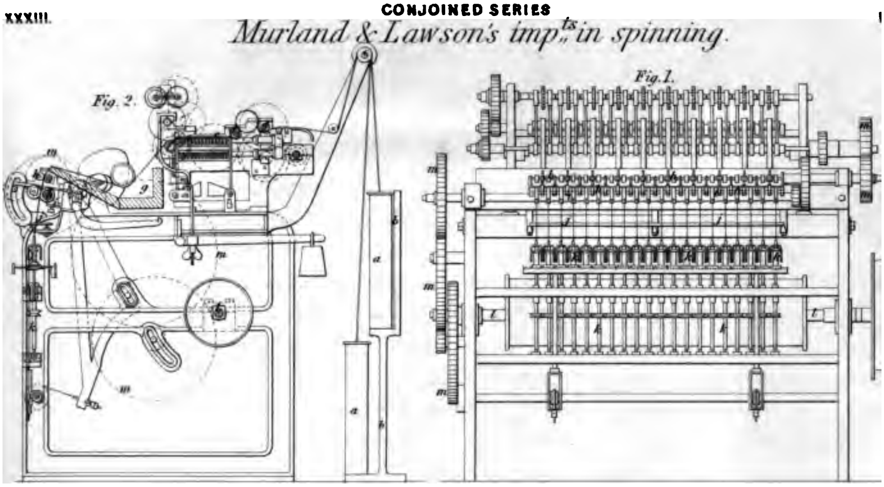
Fig. 5.

Murland & Lawson's imp^{ts} in spinning.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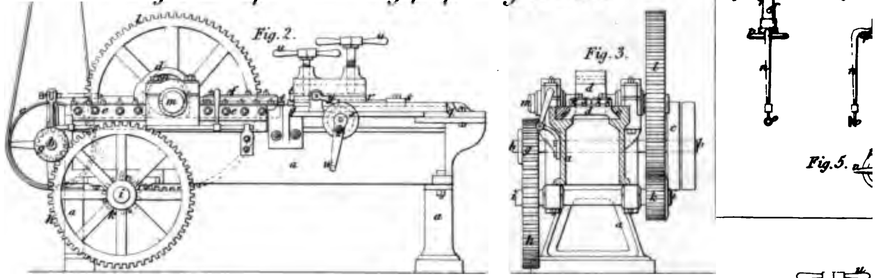
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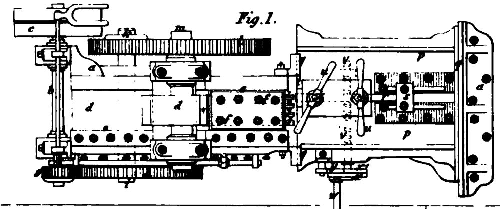


Fig. 1.

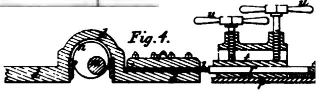
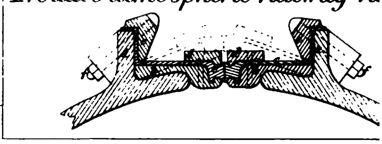
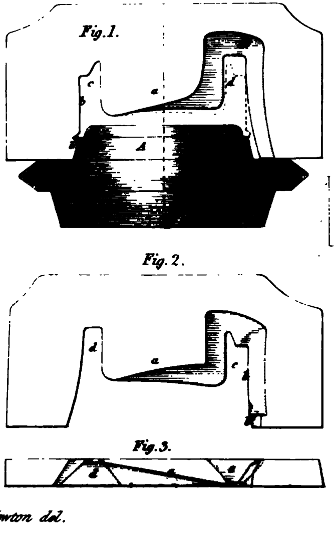


Fig. 4.

Froude's atmospheric railway va



Pratt's imp^{ts} in making earthenware.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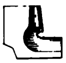
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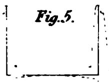


Fig. 5.

Jennings' imp^{d} cocks.

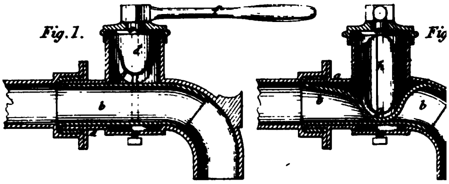
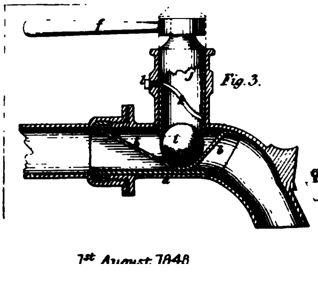


Fig. 1. Fig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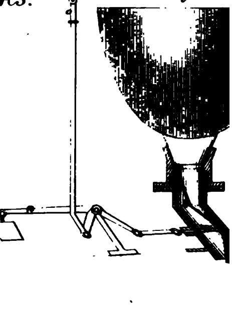
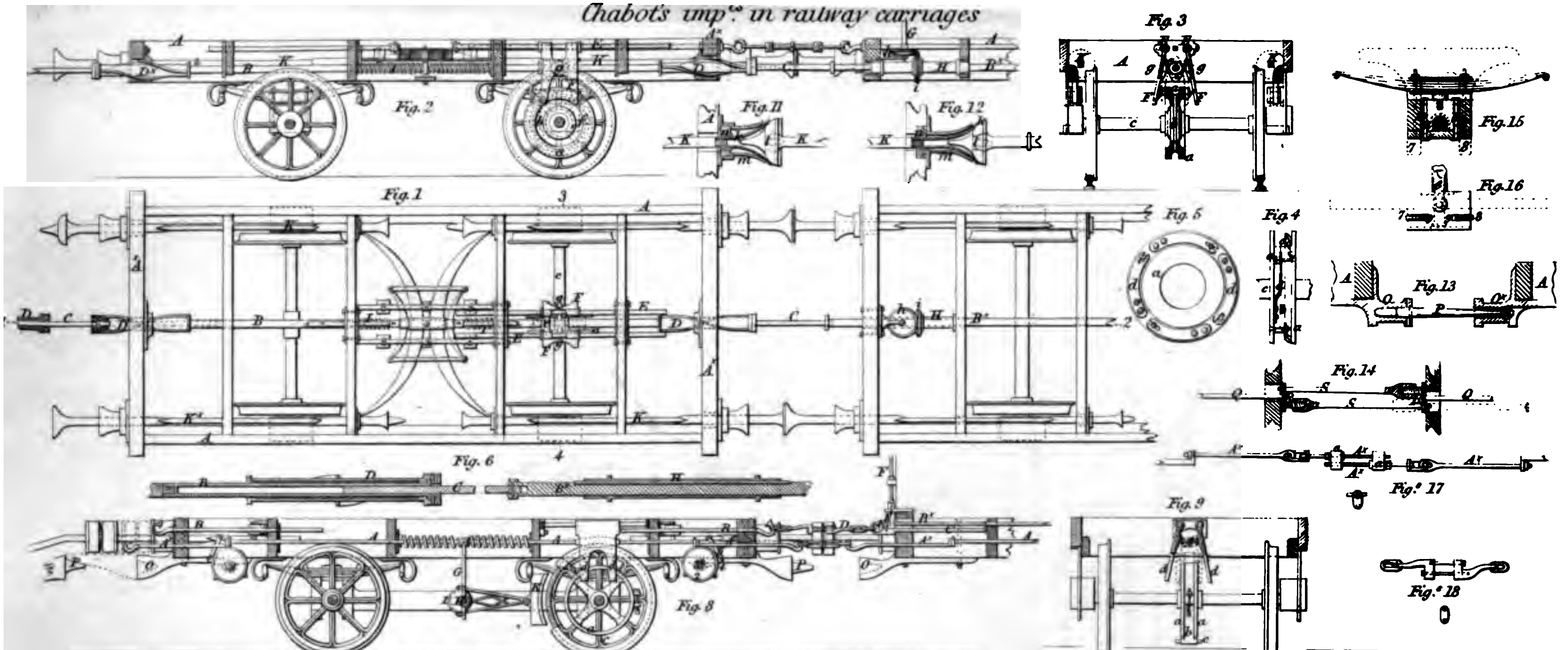
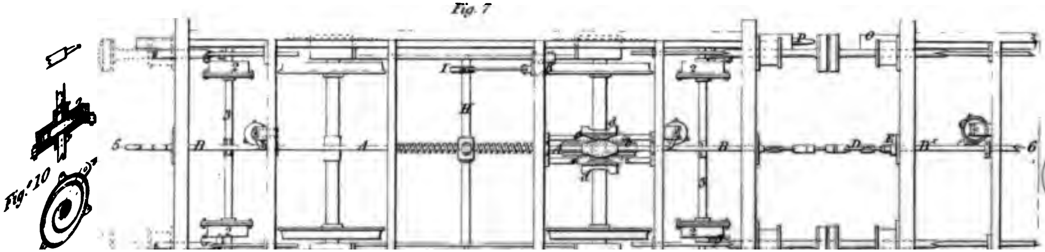


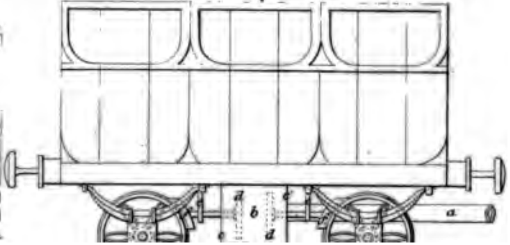
Fig. 4.

Chabot's imp^{ts}. in railway carriages

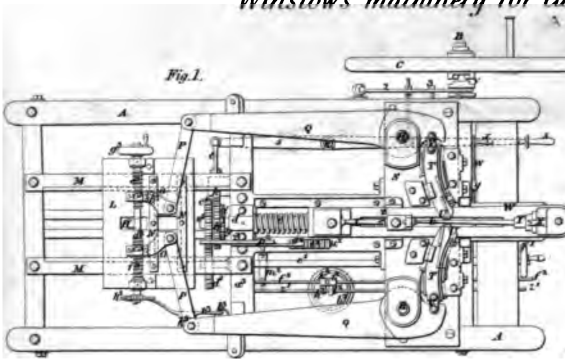


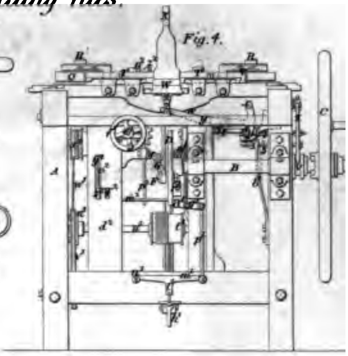


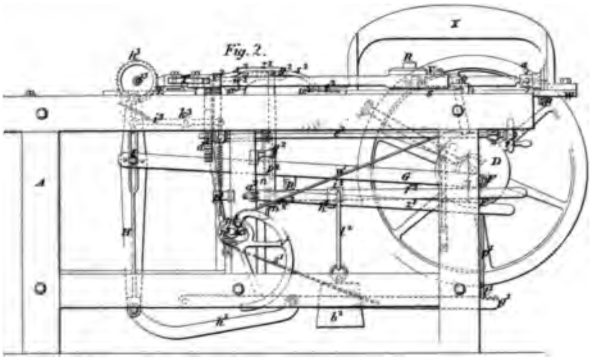
Lister's imp^{ts}. in brakes

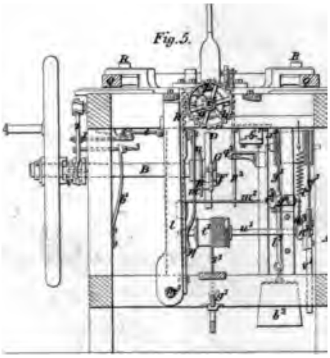


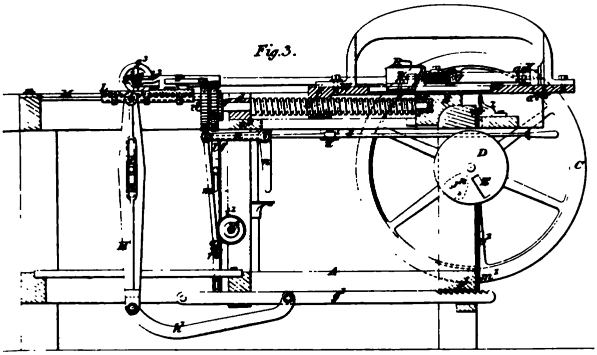
Winslow's machinery for cutting files.



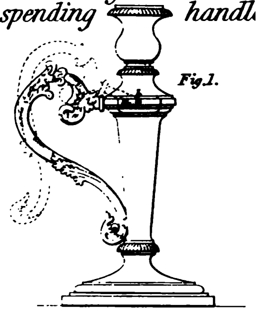


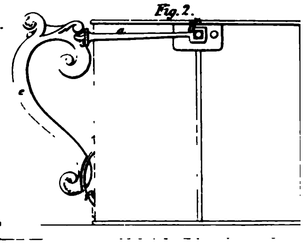




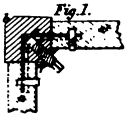


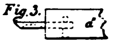
Ferryman's suspending handl

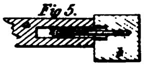


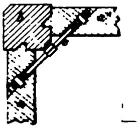


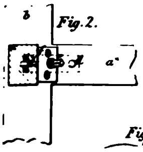
Hickman's impts. in bedsteads, &c.

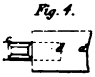


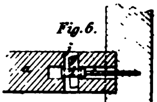


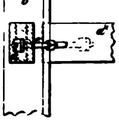


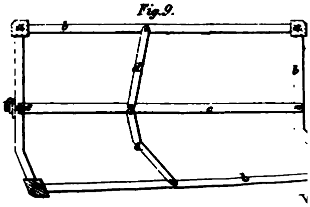


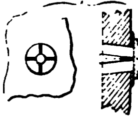


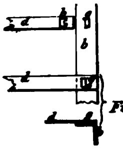












wton del.

1st Septr. 1848.

CONJOINED SERIES

Rochaz' impts in obtaining zinc ores.

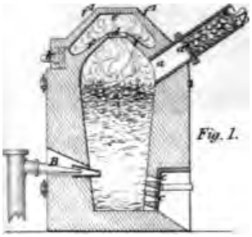
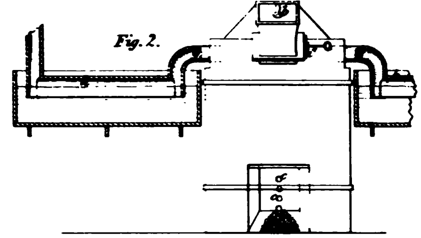


Fig. 1.

Fig. 2.



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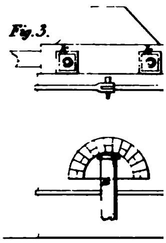

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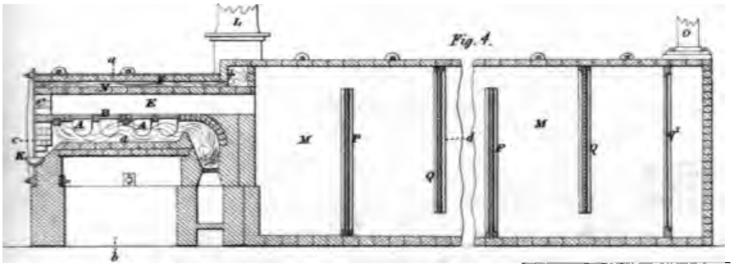

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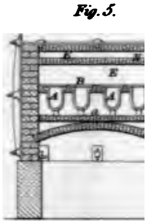

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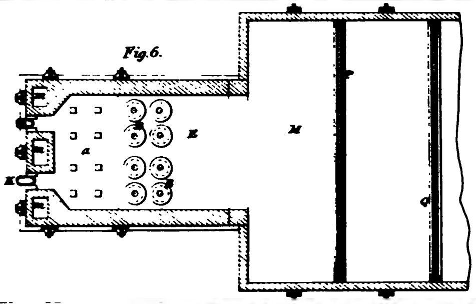

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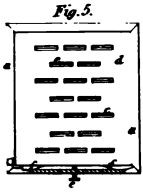

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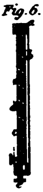

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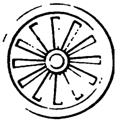

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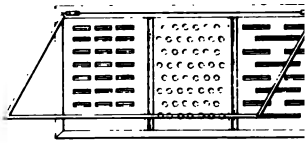
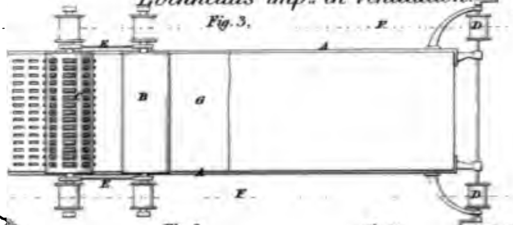


Lochheads impts in ventilation.

Fig. 3.



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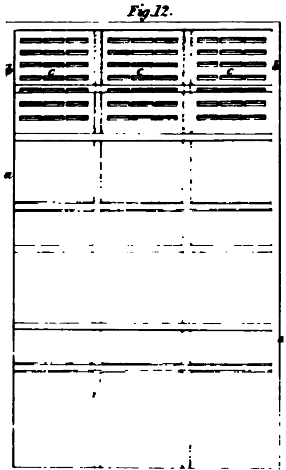

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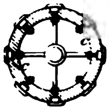

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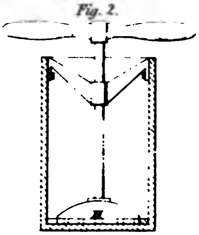

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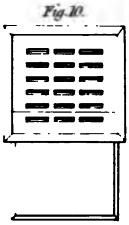

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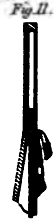
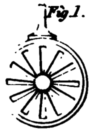
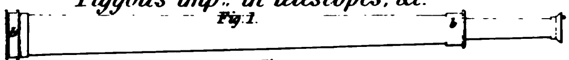


Fig. 1.



Piggott's impts in telescopes, &c.

Fig. 1.



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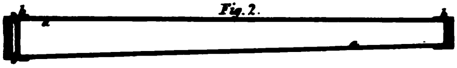

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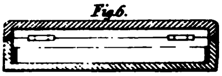

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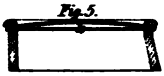

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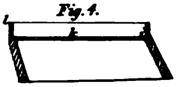
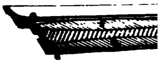


Fig. 3

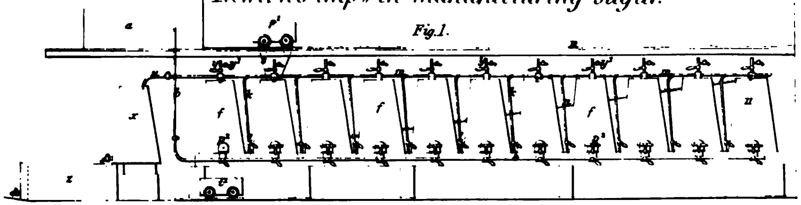


W. Newton del.

1st Sept. 1848.

Newton's imp^{ts} in manufacturing sugar.

Fig.1.



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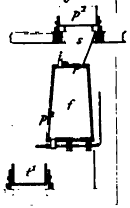
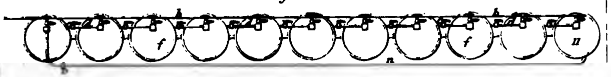


Fig.3.



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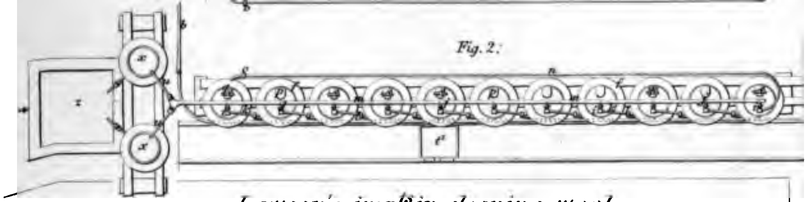
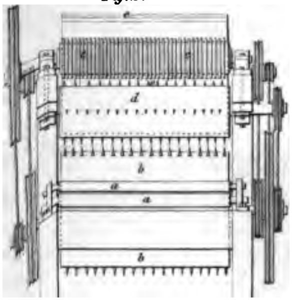


Lawson's imp^{ts} in cleaning wool.

Fig.2.



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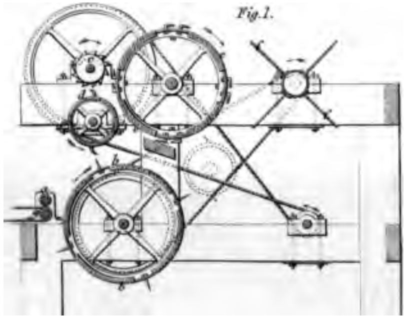


Haxby's signal app^{ts}

Fig.2.

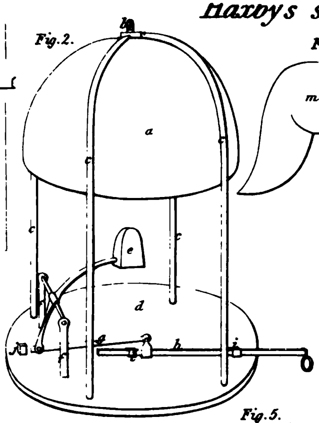


Fig.1.

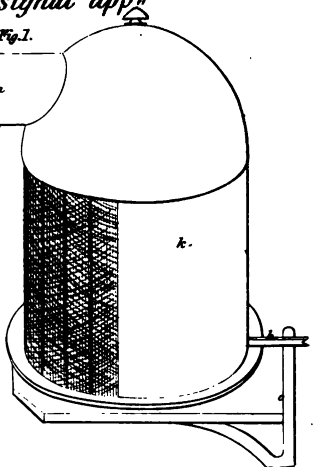


Fig.3.

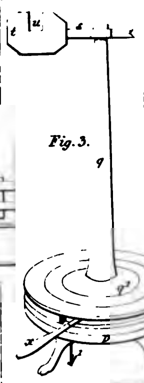
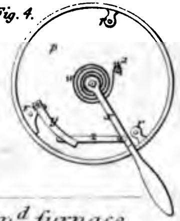


Fig.5.

Fig. 4.



Blackwell's imp^{d} furnace.

Fig.2.

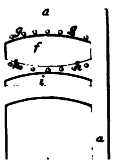
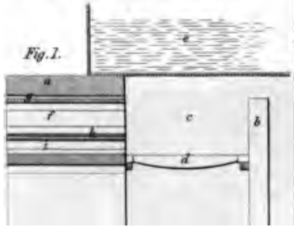
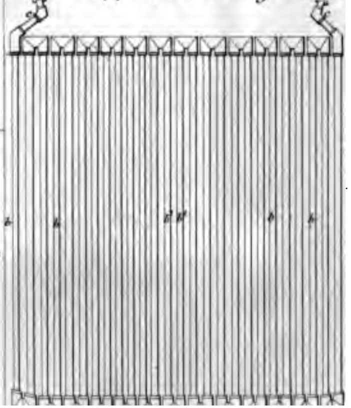


Fig.1.



Black's app^{ts} for heating water.



Roberts' railway signal apparatus.

Fig. 1.

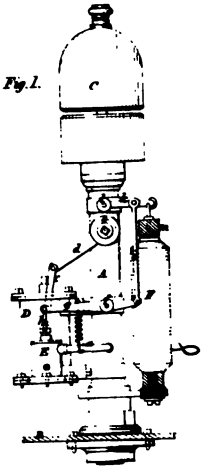


Fig. 2.

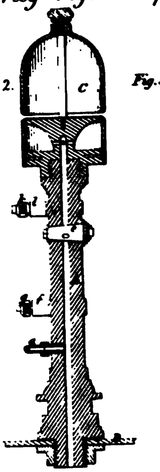


Fig. 5.

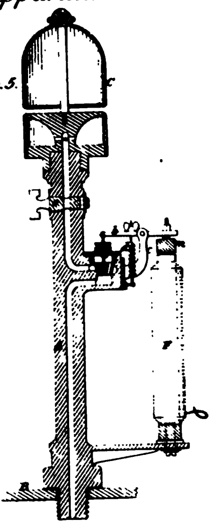
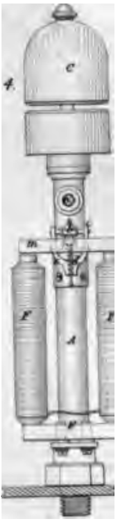


Fig. 4.



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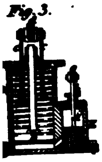

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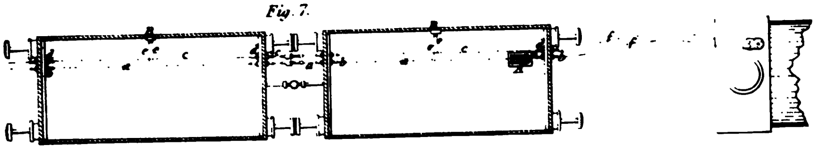
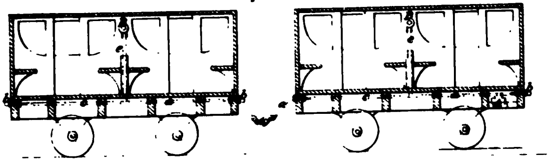


Fig. 6.



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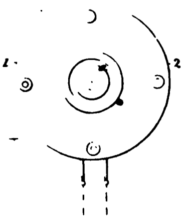

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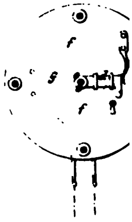

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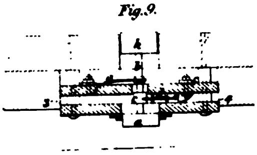
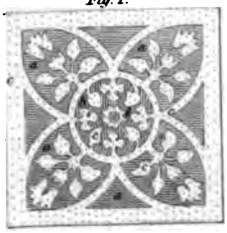


Collins & Reynolds' imp.ts in ornamenting china.

Fig. 1.



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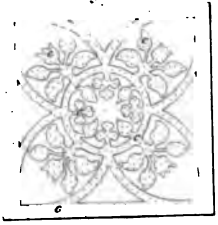

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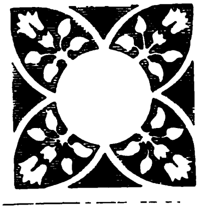


Fig. 2.

Vint's imp.ts in propelling.

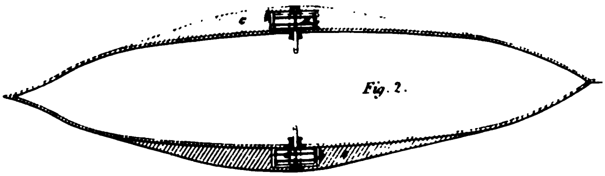


Fig. 2.

Fig. 3.

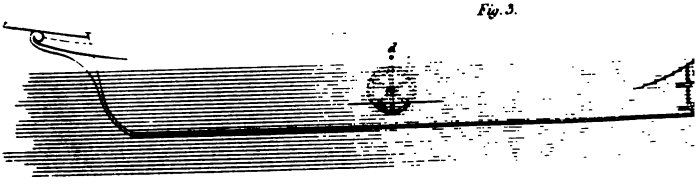
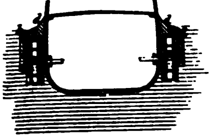
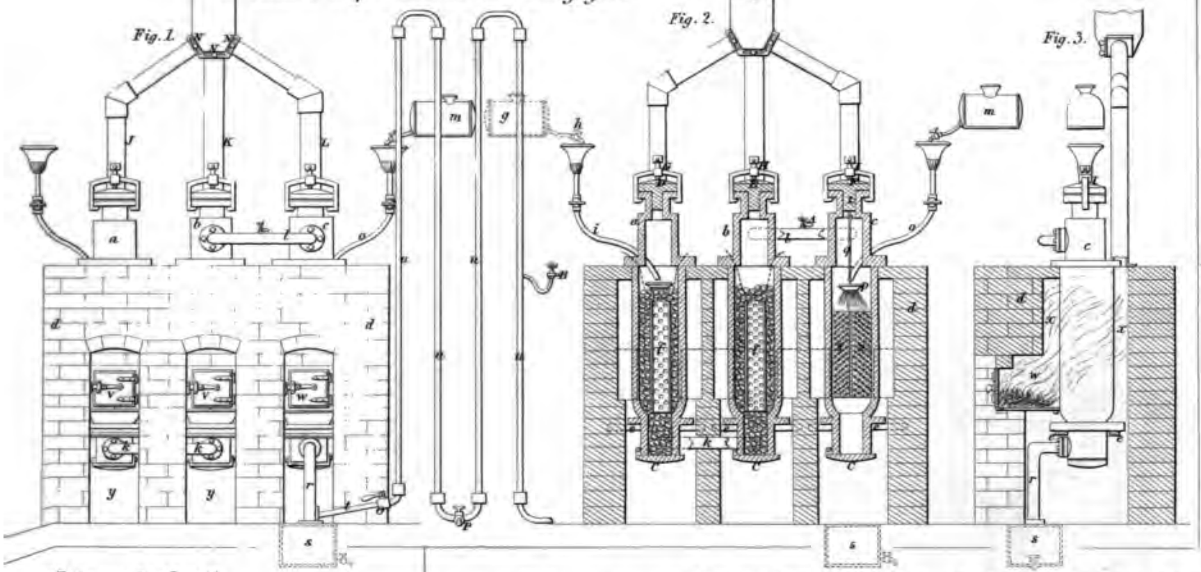


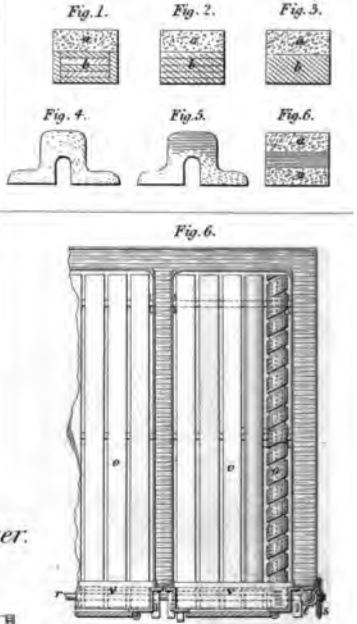
Fig. 1.



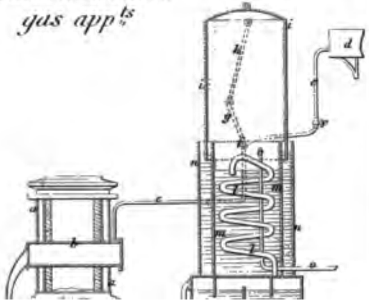
Whites impts in manufacturing gas.



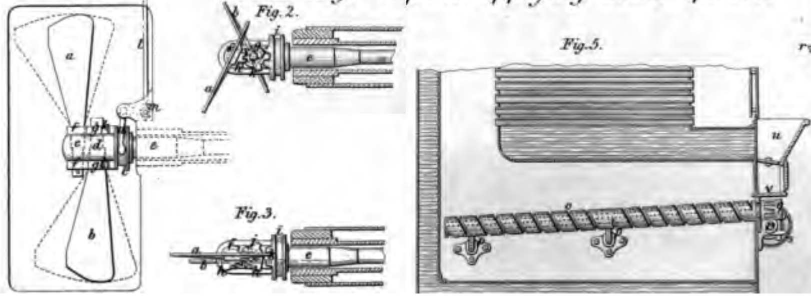
Thorneycrofts impd rails.

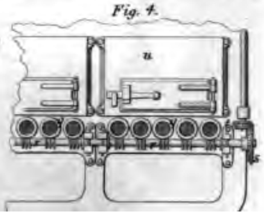


Watson & Cart's gas appts

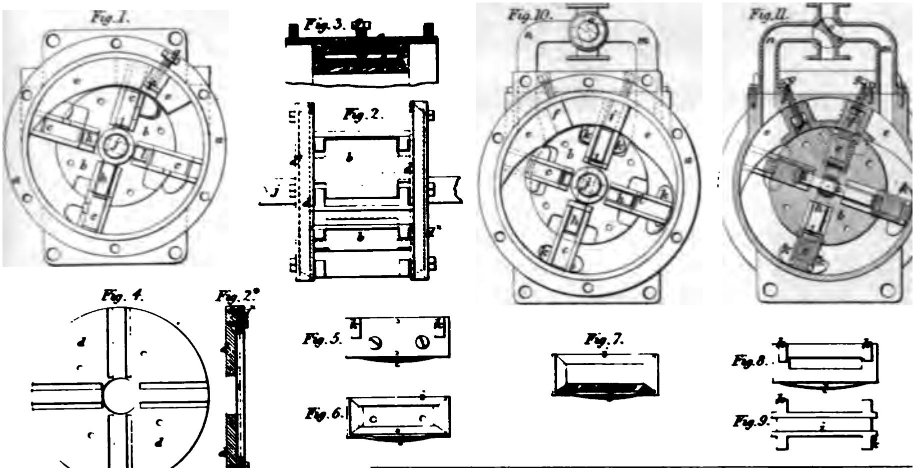


Maudslay's impts in applying motive power.

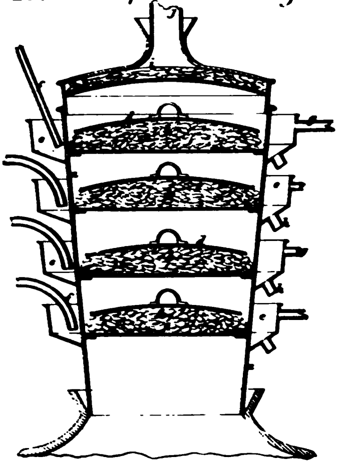




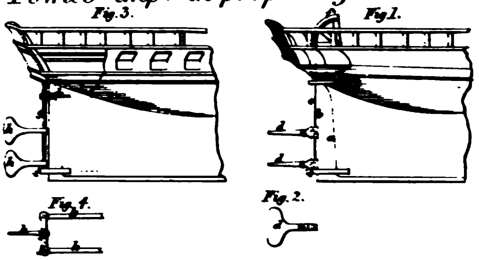
Hornblower's imp.ts in rotary engines & pumps.



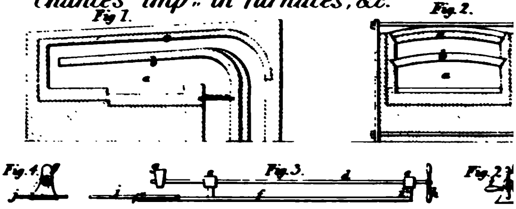
Tottie's imp.ts in distilling.



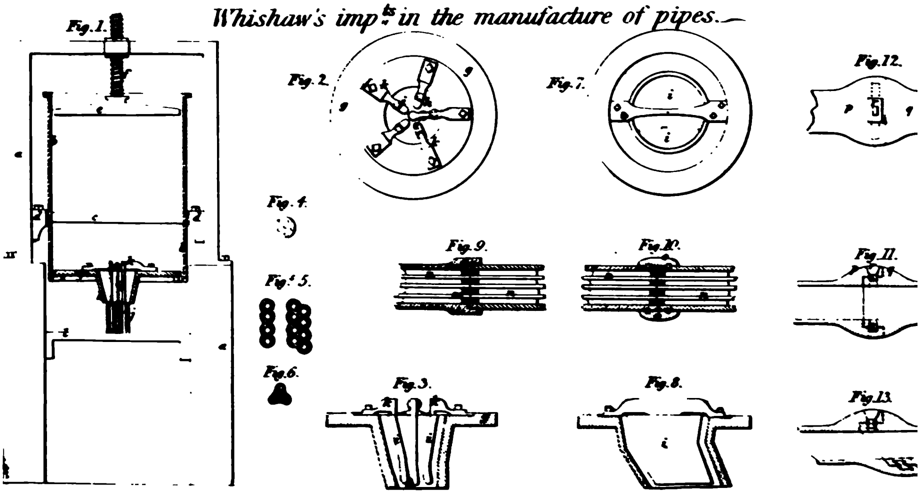
Fowles' imp.ts in propelling.



Chance's imp.ts in furnaces, &c.



Whishaw's imp.ts in the manufacture of pipes.



wton del.

1st Oct 1848.

Baranowski's calculating machine.

Fig. 1.

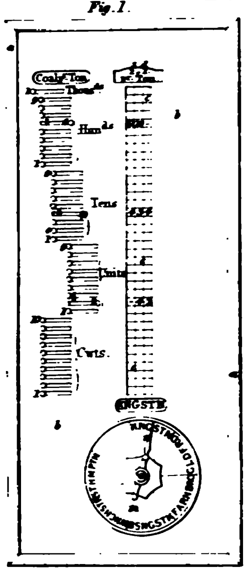
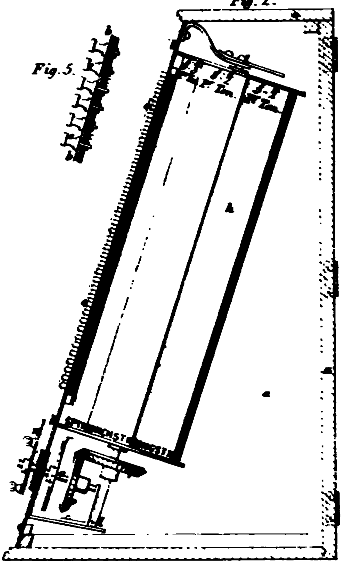


Fig. 2. Fig. 5.



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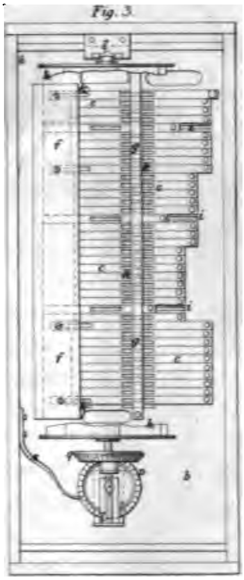


Fig. 4.

Babington & Spurgin's imp.ts in pens.

Fig.s 1.

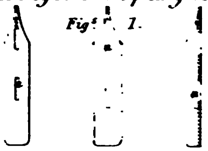
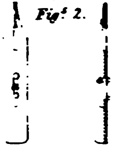


Fig.s 2.



Zerman's imp.ts in ships.

Fig. 1.

Fig. 2.

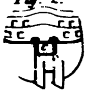


Fig. 5.

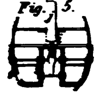
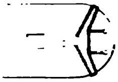


Fig. 3.



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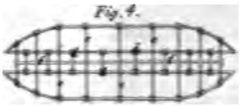


Lambert's imp.d nail making mach.s

Fig. 2.

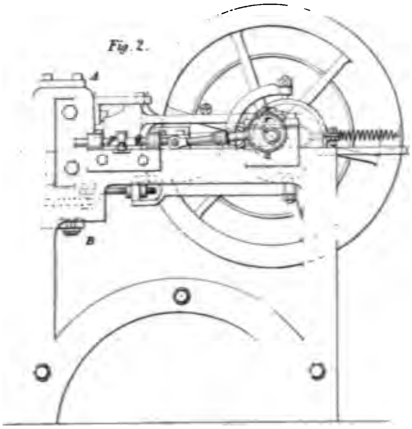
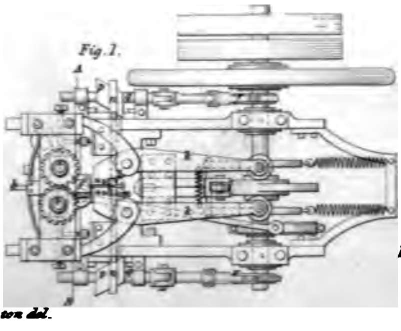


Fig. 1.



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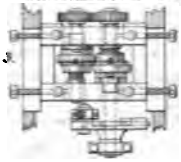

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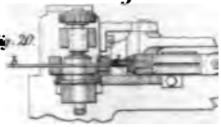

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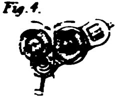


Fig. 6.

Fig. 7.

Fig. 5.

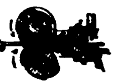


Fig. 16. Fig. 17.

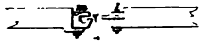
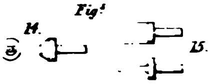
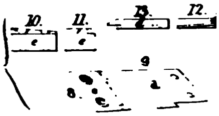


Fig. 18. Fig. 19.

Fig.s 14. 15.





Newton del.

1st Nov.r 1843.

Eaton's imp^{ts} in roving.

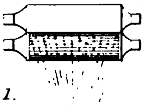
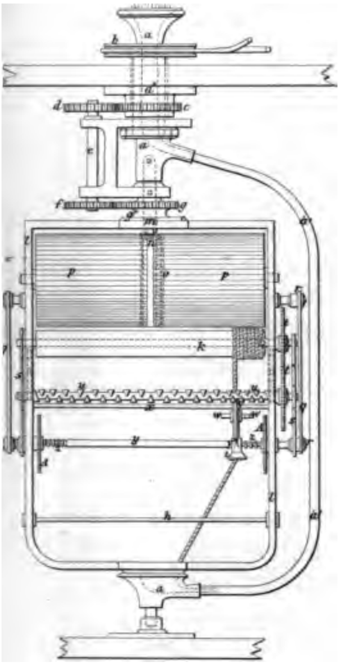


Fig. 1.



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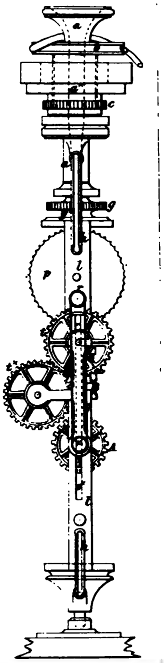

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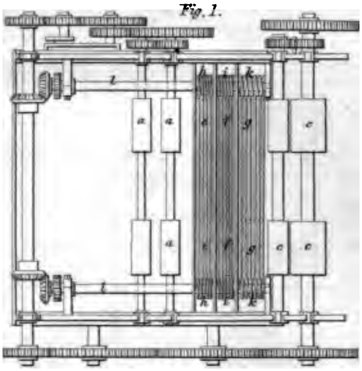

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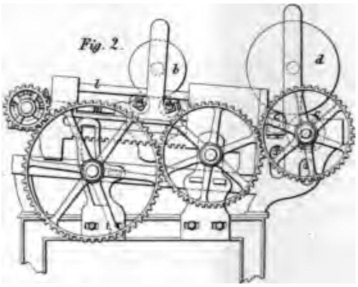

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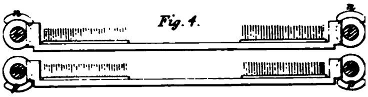
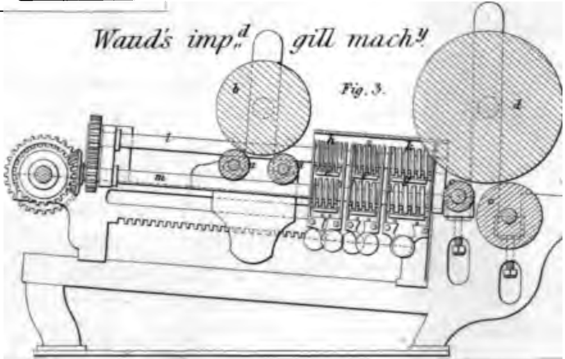


Waud's imp^{d} gill mach^{y}

Fig. 3.



Sewell's imp^{ts} in preparing flour.

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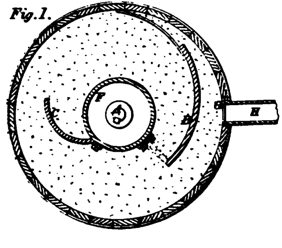

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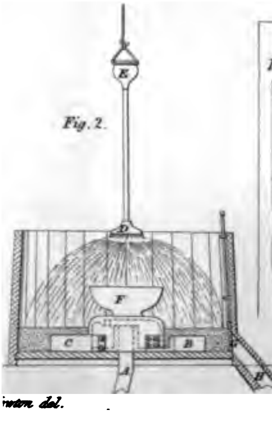
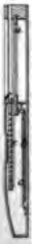


Soward's imp^{ts} in suspending windows.

Fig. 6.



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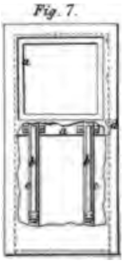

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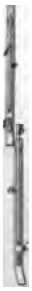

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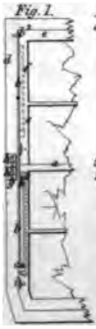

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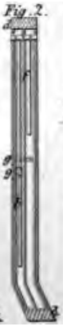

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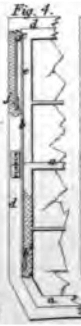

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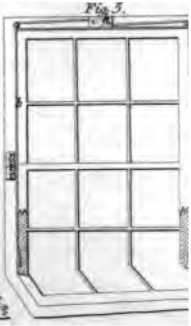

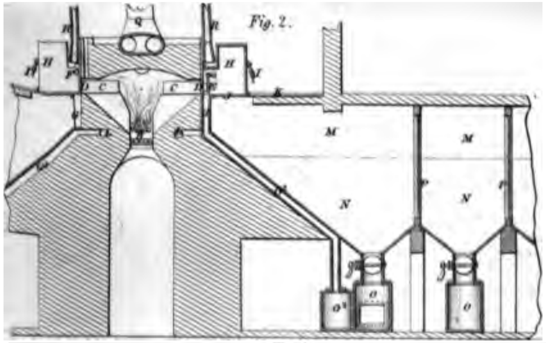

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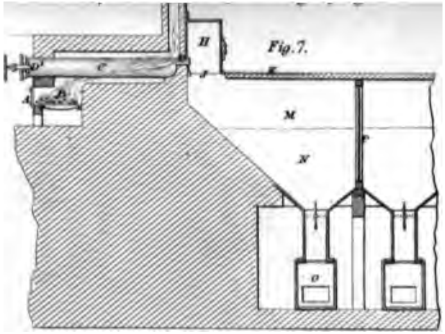

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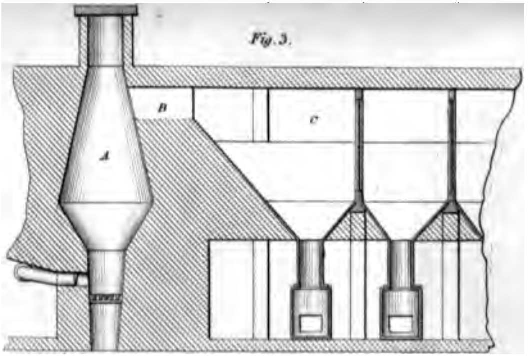

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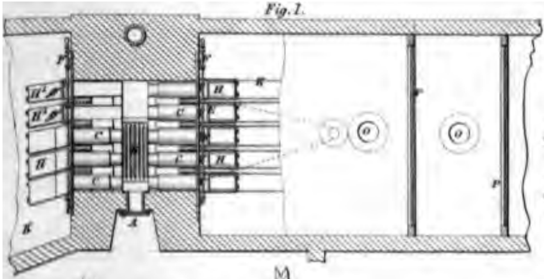

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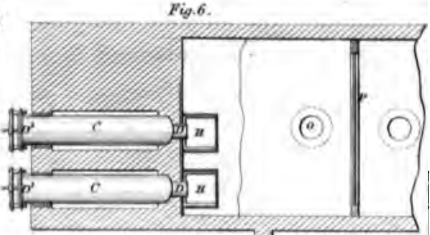

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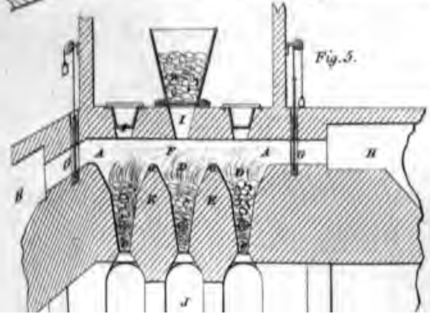

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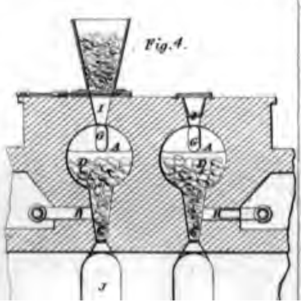
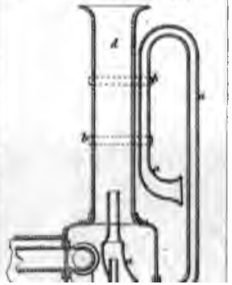
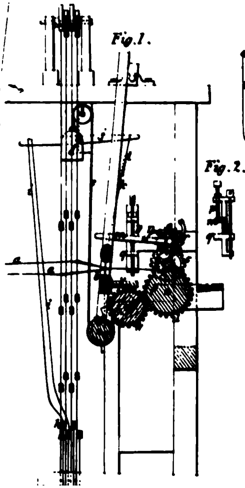


Fig. 4.

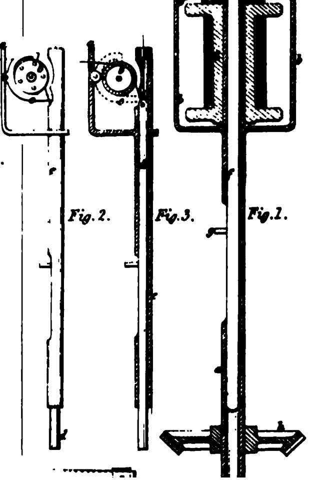
Ablon's draft app.ts



Foot's imp.d loom.



Card's imp.ts in twisting.



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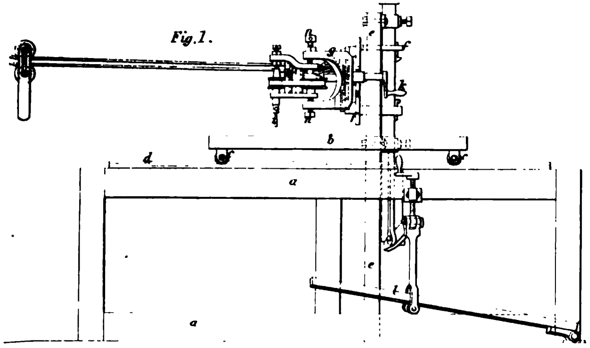

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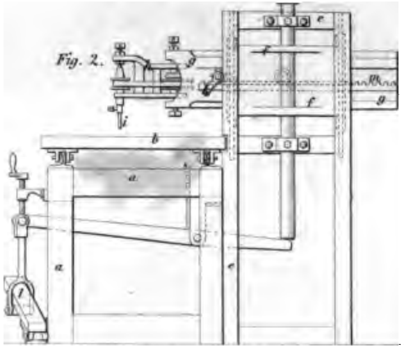

Fig. 1.

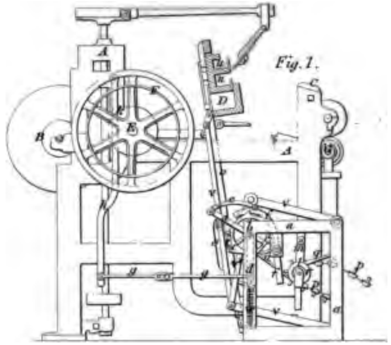

Fig. 6.

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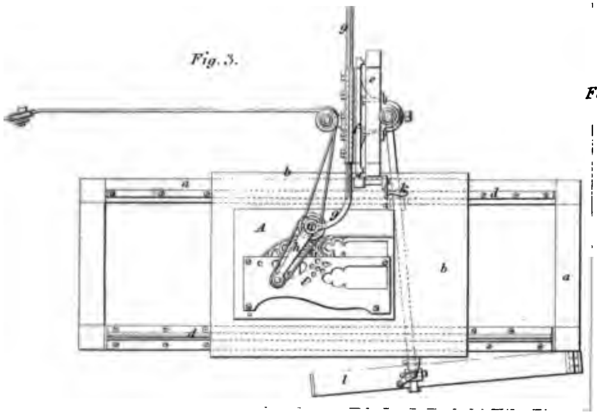


Porter's imp^ts in girders.

Fig. 8.

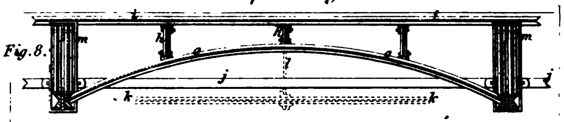


Fig. 4.

Fig. 7.

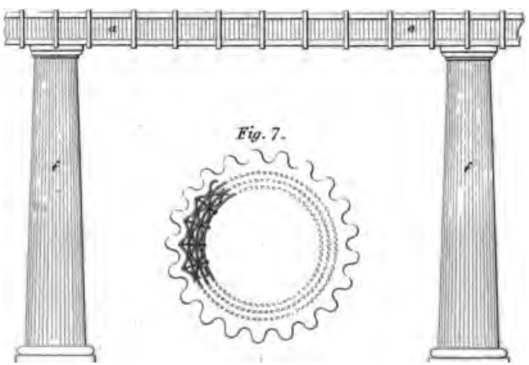
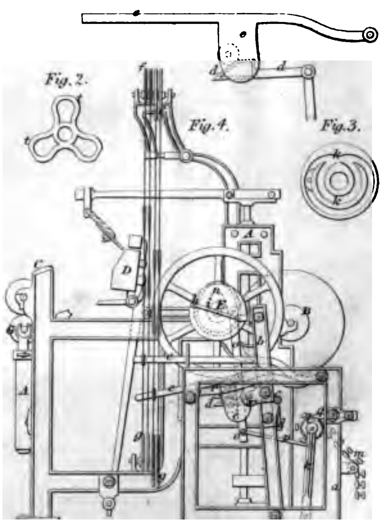


Fig. 5.

Fig. 2.

Fig. 4.

Fig. 3.



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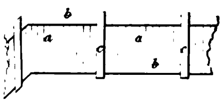


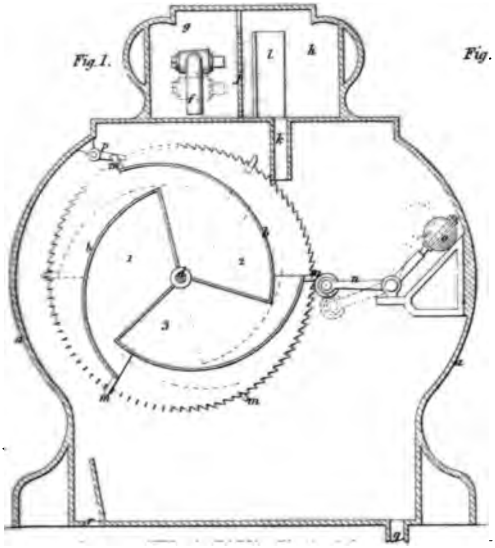
Fig. 2.

Fig. 3.

Fig. 6.

Fig. 5.

Haigh's imp.d app.s for measuring liquids.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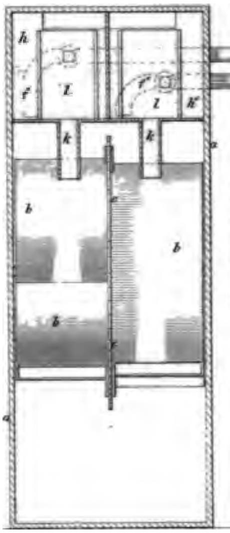
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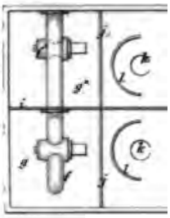
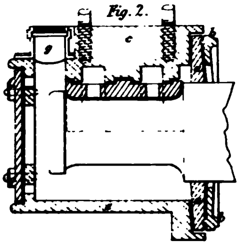


Fig. 3.

Normanville's imp.d axle boxes.—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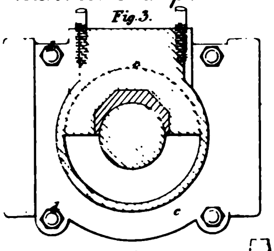
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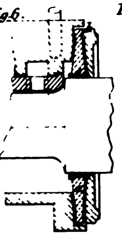
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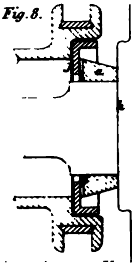
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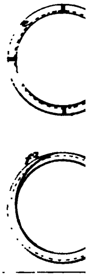

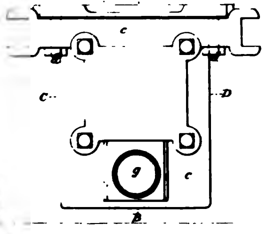
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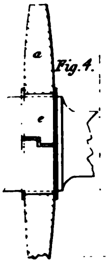
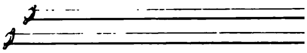
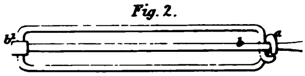


Fig. 4.

Goode's manure distributo

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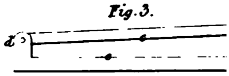
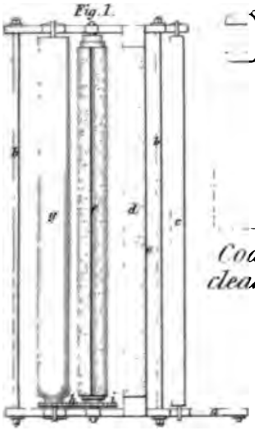


Fig. 3.

Coates' imp.ts in cleaning cloth.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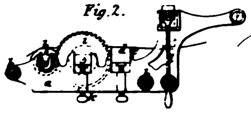
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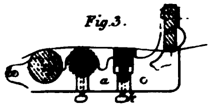
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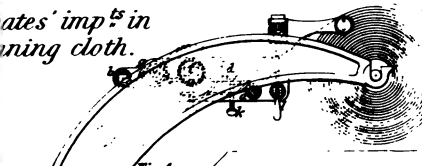
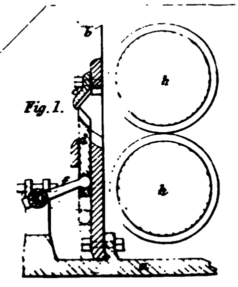


Fig. 4.

Rufsell's app.ts i making bar iro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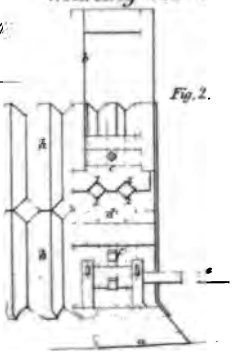
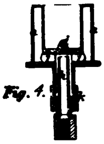


Fig. 2.

W. Newton del.

1st Decr 1848.

Burleigh's imp^{ts} in lighting & heating.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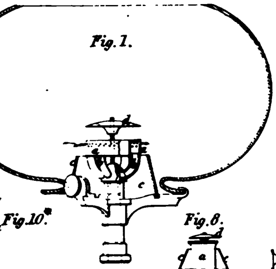
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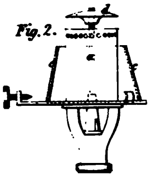
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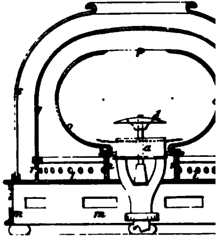
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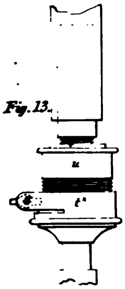
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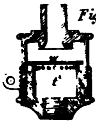
Fig. 10.*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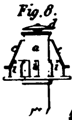
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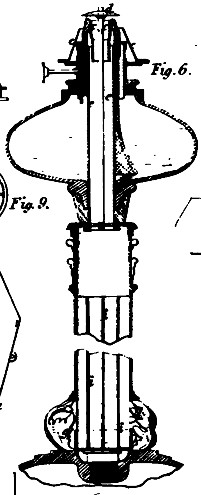
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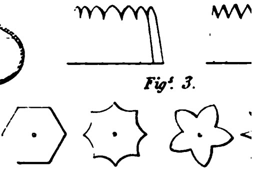
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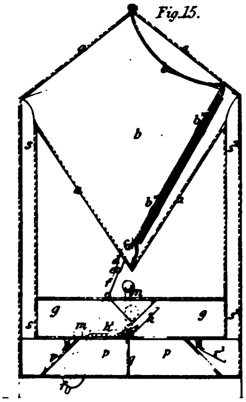
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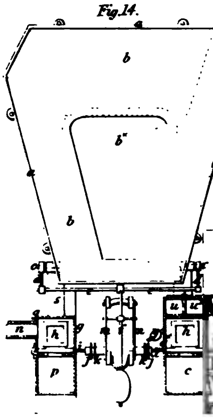
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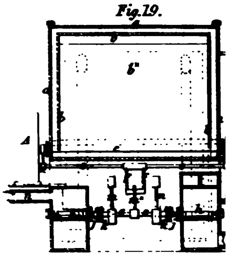
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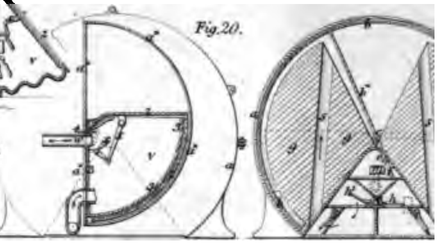
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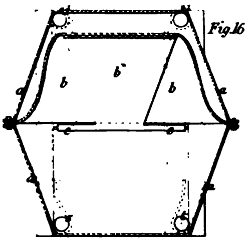
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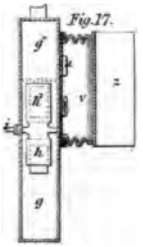
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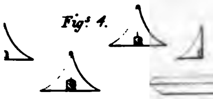
Hartes' imp^{d} seed depositors.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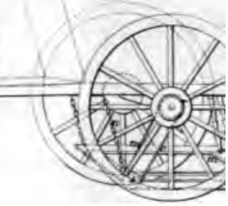

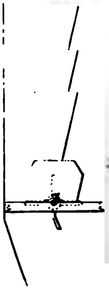
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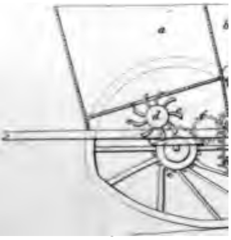
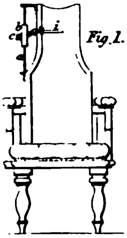


Gilbert's app^{ts} for extracting teeth.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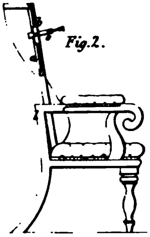
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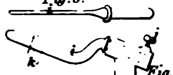
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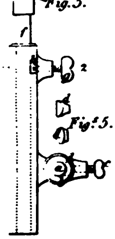
Fig. 3.

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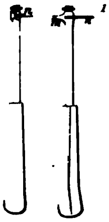
Figs. 9.

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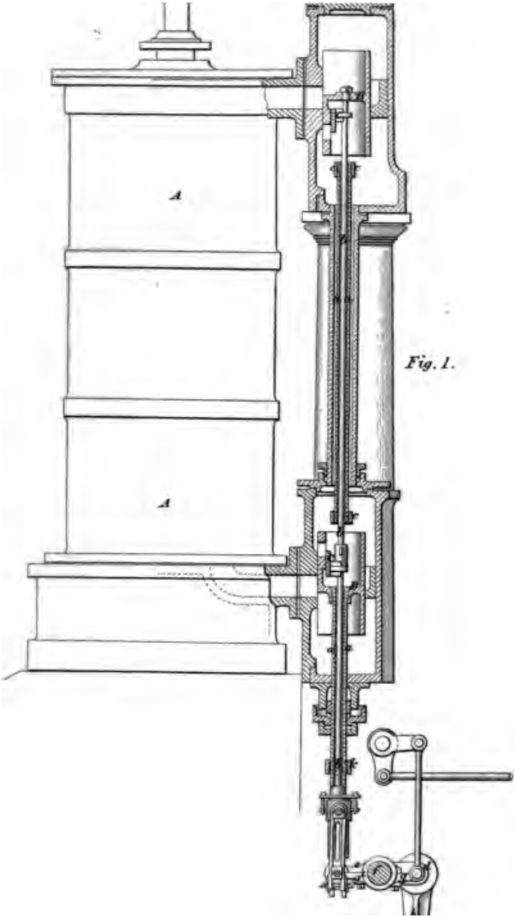
Fig. 4.

Parkes' imp.ts in steam engines.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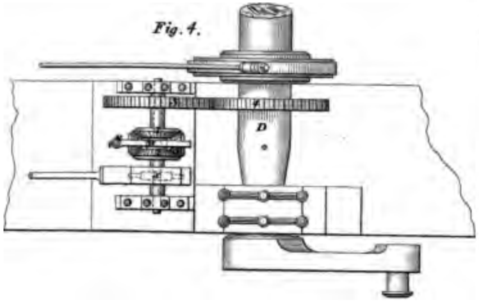
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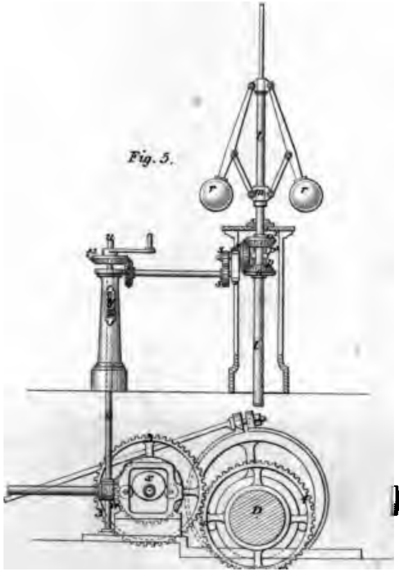
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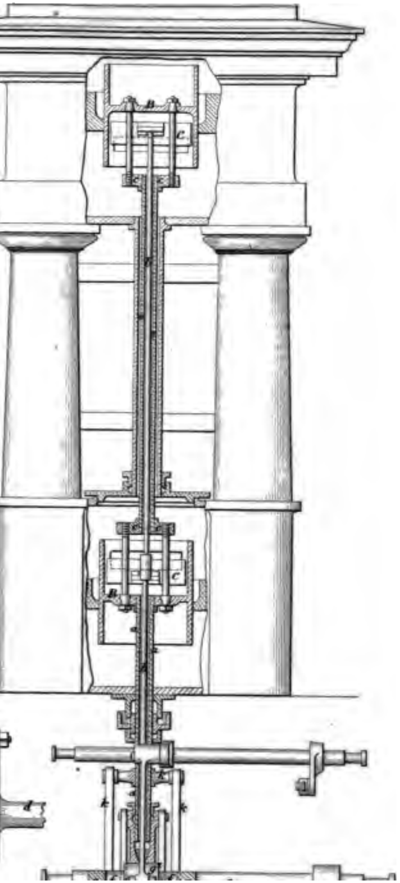
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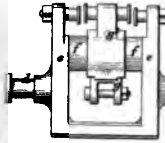
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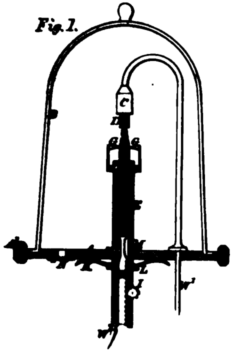

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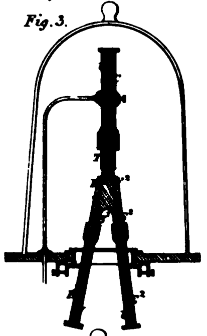

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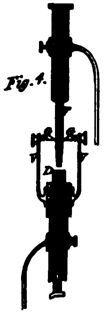

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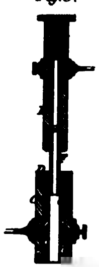

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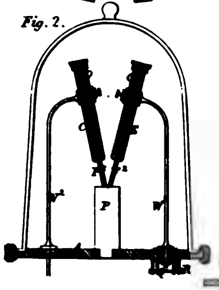

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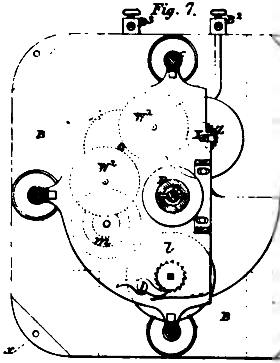

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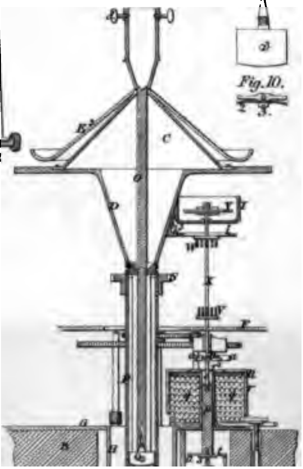
Fig. 10.



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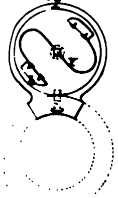

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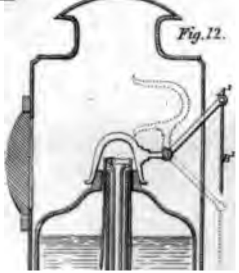

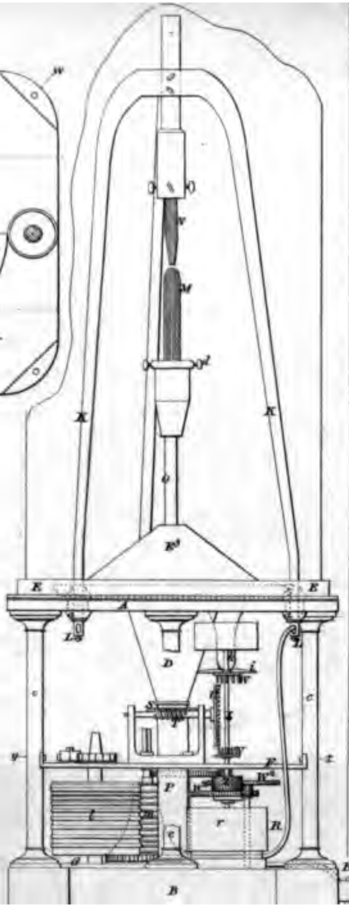

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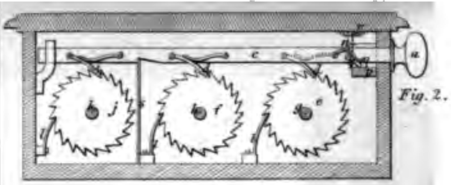

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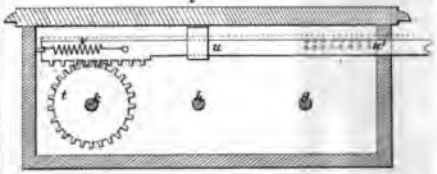

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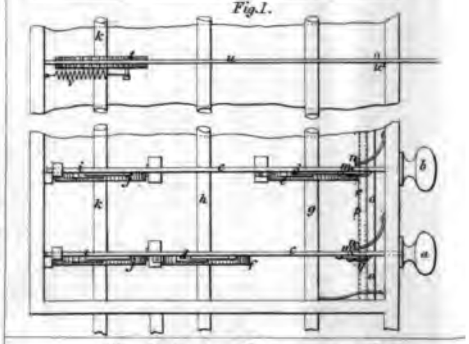
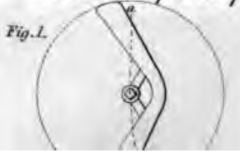


Poole's imp.ts in propelling.

Fig. 1.



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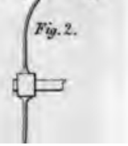
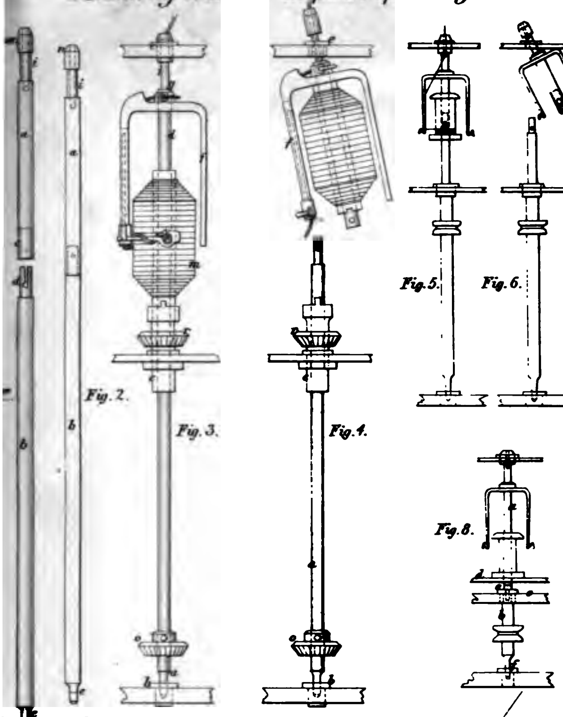
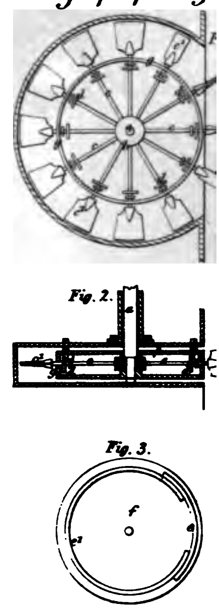


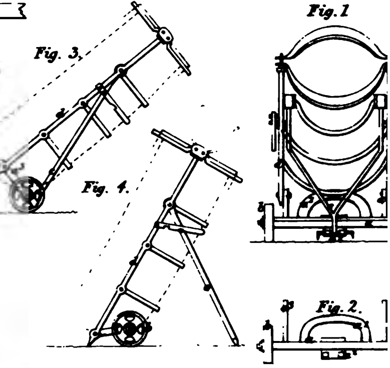
McLardy & Lewis' imp^{ts} in spinning.



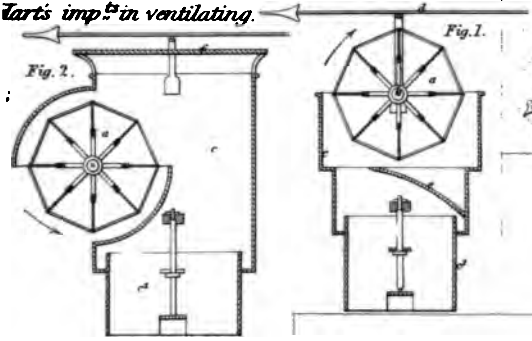
Dailey's propelling

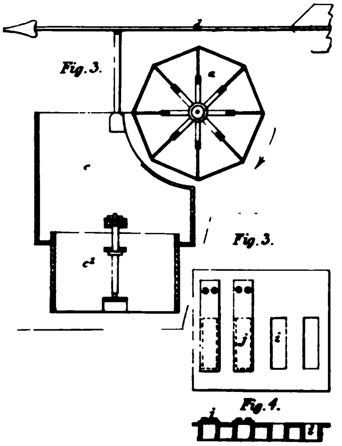


Cooch's imp^{d} sack-holder



arts imp^{ts} in ventilating.





Humphry's imp^{ts} in steam engine